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Broadwell Basin Residuals Repository

(Specified Hazardous Waste Facility)

San Bernardino County, California

Draft Environmental Impact Report/ Environmental Impact Statement

SCH 89020054

June 1991

Prepared For:
County of San Bernardino
Planning Department

U.S. Department of the Interior
Bureau of Land Management

Prepared By:
Tetra Tech, Inc.
San Bernardino, Ca

Applicant:
Broadwell Corporation
Torrance, Ca

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DRAFT
ENVIRONMENTAL IMPACT REPORT/ ENVIRONMENTAL IMPACT STATEMENT
(SCH# 89020054)

BROADWELL BASIN RESIDUALS REPOSITORY
(Specified Hazardous Waste Facility)

SAN BERNARDINO COUNTY, CALIFORNIA

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COVER SHEET

DRAFT ENVIRONMENTAL IMPACT REPORT/ENVIRONMENTAL IMPACT STATEMENT
BROADWELL BASIN RESIDUALS REPOSITORY
SAN BERNARDINO COUNTY, CALIFORNIA

a. LEAD AGENCIES:

San Bernardino County Planning Department
San Bernardino, California

U.S. Department of the Interior
Bureau of Land Management
Barstow, California

b. PROPOSED ACTION: Construction and operation of a Specified Hazardous Waste Facility (Broadwell Basin Residuals Repository) and the issuance of associated right-of-way grants and mineral material sales permits.

c. Comments should be submitted to the County of San Bernardino at the address given below. For further information, contact the County or BLM at:

County of San Bernardino, Planning Department
385 N. Arrowhead Ave., 3rd Floor
San Bernardino, CA 92415-0182
(714) 387-4099
Attention: Mr. Randy Scott

Bureau of Land Management
150 Coolwater Lane
Barstow, CA 92311-3221
(619) 256-3591
Attention: Ms. Sharon Paris

d. **Designation:** Draft Environmental Impact Report/Environmental Impact Statement (EIR/EIS).

e. **Abstract:** In October 1989, the County of San Bernardino issued a Notice of Preparation (NOP) of an EIR in response to an application submitted by the Broadwell Corporation for the construction of a Specified Hazardous Waste Facility to be called the Broadwell Basin Residuals Repository. In November 1990, the Bureau of Land Management (BLM) issued a Notice of Intent (NOI) to prepare an EIS in response to applications submitted by the Broadwell Corporation in September 1990 for a right-of-way to the site, and mineral material sales permits for coarse and clay materials. In accordance with the California Environmental Quality Act (CEQA) and the National Environmental Policy Act (NEPA), the County and BLM are preparing this joint EIR/EIS. The proposed action consists of an aboveground Class I (solid and dry waste) disposal area with a capacity of approximately 16 million tons, the improvement of six miles of the existing Crucero Road and construction of two and one-half miles of realigned Crucero Road, and the mining of 10.4 million tons of coarse borrow material and five and one-half million tons of clay material from borrow sites on 363 acres and 227 acres, respectively. The alternatives to the proposed action include: (1) alternate alignments for Crucero Road in Section 5; (2) improvement of the existing Crucero Road; (3) rail haul of waste to the Repository; (4) Repository without onsite treatment facility and reduction in daily waste load; and (5) the No-Action alternative. Issues identified through the scoping process and evaluated in this document include geology, soils, hydrology, noise, biological resources, cultural and paleontological resources, air quality, water supply and quality, scenic/visual resources, transportation, land use, and public health and safety. If no mitigation measures are implemented, significant impacts from the proposed action would occur on geology, hydrology, noise, biological resources, cultural and paleontological resources, air quality, land use, and public health and safety. However, with the implementation of the mitigation measures identified in this document, most impacts would be reduced to a level of non-significance. Impacts on air quality would remain significant and unavoidable but would be within acceptable limits established by the regulatory authorities. Twelve technical studies covering various issue topics were prepared in connection with the proposed project. Copies of these studies are available on request.

f. Comments on this Draft EIR/EIS should be received by: **TBS**

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SUMMARY

SUMMARY

INTRODUCTION

The Broadwell Corporation proposes to construct a Specified Hazardous Waste Facility, to be called the Broadwell Basin Residuals Repository, on Broadwell Dry lake near Ludlow, in the central section of San Bernardino County, California. The County of San Bernardino (the County), as the lead agency under California Environmental Quality Act (CEQA), and the Bureau of Land Management (BLM), as the federal lead agency under the National Environmental Policy Act (NEPA) for the purposes of the proposed action have authorized the preparation of this Environmental Impact Report/Environmental Impact Statement (EIR/EIS) to assess the potential effects of the project in accordance with the CEQA and NEPA, respectively.

SCOPE OF THE EIR/EIS

In response to Broadwell Corporation's application for a General Plan Amendment and Conditional Use Permit to construct the proposed facility, the County, in October 1989, completed an Initial Study and determined that an EIR must be prepared. A Notice of Preparation (NOP) of an Environmental Impact Report and Public Scoping Meeting was circulated on October 17, 1989, to all responsible agencies and interested citizens and groups. A public meeting was held on November 1, 1989, in Newberry Springs, California, to identify the issues and concerns that should be discussed in the EIR.

The County also formed a Local Advisory Committee (LAC), a formal local review group, of residents and local business owners as representatives of community interests. The LAC first met in November 1989 and has continued to meet on a semimonthly basis. Ultimately, the LAC will provide a report to the County Board of Supervisors.

In response to applications submitted by the Broadwell Corporation in September 1990, the BLM published a Notice of Intent (NOI) to prepare an EIS in the *Federal Register* on November 5, 1990. Because some of the involved public lands are Wilderness Study Areas (WSA), the BLM also prepared a Notice of Proposed Action (NOPA) Lands Under Wilderness Review, which was mailed to a standard list of interested parties.

In accordance with CEQA and NEPA, the County and BLM are preparing this joint EIR/EIS. The Initial Study; the responses to the NOP, NOI, and NOPA; comments received during public scoping; and discussion and concerns of the LAC have identified the following issue categories or resources for analysis in this document:

- Geology (including geologic hazards);
- Soils;
- Hydrology (including flood hazards);

- Noise;
- Biological resources;
- Cultural and paleontological resources;
- Air quality;
- Water supply;
- Scenic/visual resources;
- Transportation/circulation;
- Land use; and
- Public health and safety.

PROPOSED ACTION

The proposed facilities for the Broadwell Basin Residuals Repository would consist of approximately 316 acres of aboveground disposal area and support facilities including a treatment facility with a capacity to handle 16 million tons of waste over a 20- to 50-year period. Additional requirements include 363 acres of coarse material borrow area, and 227 acres of clay borrow area. Approximately six miles of the existing Crucero Road, currently unpaved, would be upgraded and paved from its intersection with Interstate 40 at Ludlow to a point six miles north. Additionally, a two and one-half mile portion of the existing road would be realigned so that it would be above the Broadwell Basin 100-year flood levels. The mound created by the materials placed in the disposal area would eventually rise 130 feet from the dry lake bed. The site is planned on the edge of the Broadwell Dry Lake where the naturally occurring clay deposits measure 150 feet deep and groundwater is approximately 80 feet below the surface. The clay bed, in addition to the multiple liner design for the facility, would provide additional assurance that leachate from deposited waste would not contaminate groundwater. The project would be sited within the 100-year floodplain boundaries. Flood protection would be provided by the construction of a surrounding earth berm, which would be 35 feet high and 230 feet wide. The engineered plan would conform to the applicable federal Environmental Protection Agency and California Department of Health Services requirements for a facility of this type. Similarly, Crucero Road improvements would be designed to accommodate 100-year flood constraints.

All incoming waste would be transported to the project area by a registered hauler in vehicles certified to be in compliance with state and federal hazardous waste transport requirements. The quantity of incoming waste is estimated to be 2,000 tons per day, of which about 1,000 tons may require onsite treatment. About 80 to 200 truckloads per day, depending upon the size of the trucks (10 to 25 tons per truck) would be required to haul the waste materials to the Repository. At the peak of construction, approximately 100 construction workers and supervisory personnel would be involved for a period of less than a year. During the operations period, permanent personnel requirements are estimated at 35 to 45 workers. However, as many as 45 to 55 persons, including permanent employees, regulatory personnel, and visitors, may be at the site on any given day. The water demand for operations is estimated at 70,000 gallons per day. Most of the operations requirements, except for drinking water, would be met from wells drilled for onsite project use. Drinking water would be supplied by commercial vendors.

ALTERNATIVES TO THE PROPOSED ACTION

Five alternatives to the proposed action, including the no-action alternative, have been analyzed in this report.

Alternative 1 - Alternate Realignments of Crucero Road in Section 5

This alternative analyzes realignment of Crucero Road either 1,700 feet west (Alternative 1A) or 2,700 feet west (Alternative 1B) of its existing alignment in Section 5 near Ludlow. The road would be constructed within a 60-foot-wide right-of-way and would have the same typical cross section and utility pole placement as the proposed action road alignment. All other activities identified under the proposed action would remain the same.

Alternative 2 - Improvement of Existing Crucero Road

Alternative 2 is being considered as a means to potentially reduce impacts to WSA 252 by narrowing the right-of-way from 60 feet (proposed action) to 44 feet along the roughly three-mile stretch of road that is bordered on both sides by WSAs, and by elevating the existing Crucero Road above the 100-year floodplain instead of re-routing the access road through WSA 252. The southern end of Crucero Road not constrained by the WSAs would be improved with a 60-foot right-of-way as in the proposed action.

Alternative 3 - Rail Haul of Waste to the Repository

Hauling of hazardous waste by rail is being considered for its potential to reduce air quality and noise impacts compared to the proposed action. For purposes of analysis, it is assumed that 80 percent of the waste would arrive at the site by rail and the remaining 20 percent by trucks. Rail haul would involve construction and operation of transfer-loading stations throughout Southern California, construction of about 10 miles of new track from Ludlow to the Repository, and transportation of waste by rail from various Southern California locations to the site. Implementation of this alternative would not eliminate the requirement to construct an adequate access road to the site.

Alternative 4 - Repository Without Onsite Treatment Facility and Reduction in Daily Waste Load

This alternative assumes that the treatment facility planned under the proposed action to handle approximately 1,000 tons of waste material per day would not be built on the site and the waste to be deposited at the Repository would be reduced to 1,000 tons per day. This would increase the active life of the Repository from 20 years to 50 years because no change in the capacity of the

Repository is planned. All other project-related activities would remain the same as identified in the proposed action.

Alternative 5 - No-Action Alternative

The No-Action alternative is defined as not approving the construction and operation of the proposed facilities, including the denial of right-of-way and mineral sales permits. The Environmental Setting sections of this document (Chapter 3.0) describe the conditions that would prevail if the No-Action alternative is adopted.

Alternatives Considered but Eliminated from Detailed Study

In addition to five alternatives being analyzed in detail, four more alternatives were considered but eliminated from detailed study. These are summarized below.

Dry Lake Bed Locations. In the process of selecting the location for the proposed Repository, the applicant considered and ultimately rejected 20 other dry lake bed locations in the Mojave Desert. Based on their review, analysis, and discussion of the applicant's analysis, the County and the BLM have concluded that each of the alternative dry lake sites poses an insurmountable conflict with one or more of the central siting requirements: minimizing waste transit on minor roads and through populated areas; protecting groundwater currently or potentially used for human consumption; avoiding locations on active faults; avoiding conflicts with incompatible, existing uses of lake beds or the immediately adjacent areas; and avoiding or minimizing the impacts on the critical habitat of threatened species. Therefore, those alternative dry lake sites were eliminated from further detailed consideration.

Improvements of Existing Crucero Road Right-of-Way Only. This alternative envisioned constructing the access road totally within the existing Crucero Road disturbed alignment to avoid impacts on adjoining WSAs. The existing disturbed area has a 30- to 32-foot width and would thus allow for a 26-foot-wide paved road with a two- to three-foot variable width graded shoulder. The County requires a minimum of five-foot-wide shoulders. Therefore, this alternative cannot avoid some encroachment into the WSAs. Further, a quarter-mile portion of the existing road in Section 6 lies below the 100-year flood elevation and would have to be elevated or left exposed to flooding. If elevated and constructed to County standards, the total width of the disturbed area would be a minimum of 88 feet. This would require further encroachment into the WSAs. Because this alternative does not fully eliminate the encroachment problem and because it does not meet County road standards, it was eliminated from further consideration.

Underground Repository Facility at Broadwell Site. Another alternative raised during the scoping process was to construct the repository underground. An analysis of this alternative indicated that the exposure to subsurface hydrologic conditions at the Broadwell dry lake would increase the potential for undetected accidental releases of leachates. If detected, the remediation of a release would be more difficult, because it would require removal of substantially more soil to access the release. Other environmental consequences were found to be approximately similar whether an aboveground or an underground repository was built. This alternative was, therefore, dropped from further consideration.

Aboveground Repository at Hidden Valley Site. This alternative site, located approximately 12 miles northwest of the Broadwell site, has been proposed by Hidden Valley Resources, Inc., for locating an underground residuals repository for the disposal of dry, treated, and stabilized hazardous waste. Because the goals of this proposal are similar to those of the Broadwell Corporation, this site was evaluated to determine its suitability for a repository with the Broadwell Corporation's proposed aboveground technology. An evaluation of the geologic structure of Hidden Valley indicates that the site is not suitable for the operation of a hazardous waste repository as proposed by the Broadwell Corporation. The Broadwell Basin Residuals Repository facilities are proposed on a dry lake bed to take advantage of the highly impermeable clay deposits several hundred feet deep. Clay deposits in Hidden Valley are limited to the playa area of only about 40 acres. This playa site is not sufficient to construct a more than 300-acre repository proposed by the Broadwell Corporation.

In addition to the repository site, clay is also required for the construction of berms for flood protection and as cover material for the repository. In the absence of local deposits of clay, it would have to be imported from other areas, prohibitively increasing the cost of operations. This site was, therefore, eliminated from detailed study.

ENVIRONMENTAL CONSEQUENCES AND MITIGATIONS

The environmental consequences of the proposed action and its alternatives are evaluated in Chapter 4.0 of this document for each of 12 issue categories identified through the scoping process. As applicable, each section includes a discussion of mitigation measures that would be applied to eliminate or reduce the adverse impacts. Table S-1 provides a summary of the anticipated environmental impacts associated with the proposed action and its alternatives. The table identifies the impact, the significance of the impact, mitigation measures to reduce the impacts, and the significance of residual impacts (impacts after the application of mitigation measures).

If no mitigation measures are implemented, significant impacts from the proposed action would occur on geology, hydrology, noise, biological resources, cultural and paleontological resources, air quality, land use, and public health and safety. With the implementation of the mitigation measures identified in this document, all impacts except on biological resources and air quality, would be reduced to a level of non-significance. Impacts on air quality would remain significant and unavoidable even after mitigation measures are taken. However, they would be within acceptable limits established by the regulatory authorities. Mitigation measures are identified for all adverse impacts of the proposed action, whether significant or not. Mitigation measures are not repeated for each of the alternatives unless different from those identified for the proposed action.

With the No Action alternative, project-related impacts would not occur because the project would not be approved for construction and operation. If the No Action alternative is implemented, the current needs of San Bernardino County and the Southern California region for disposal of treated hazardous waste would not be met and siting of other facilities at alternative locations would become imperative.

Environmentally Superior Alternative

CEQA requires identification of the environmentally superior alternative among other alternatives if the "No Project" alternative is also the environmentally superior alternative. NEPA calls for identification of the agency's preferred alternative or alternatives, if one or more exists. In compliance with these requirements, the proposed action and its alternatives were analyzed and it was concluded that none of the alternatives, including the proposed action, can be considered to be the environmentally superior alternative in its entirety. Instead, the environmentally superior alternative would be a combination of Alternatives 1, 2 and 4. This includes:

- Construction of the access road in Section 5 to the west of existing Crucero Road alignment to avoid conflict with airport clear zone restrictions;
- Constructing the access road north of Section 5 along the existing Crucero Road alignment. The road will meet the existing County standards and minimize the encroachment into WSA;
- Construction of the Repository without treatment facilities on the site; and
- Reduction of wasteload from 2,000 tons to 1,000 tons per day.

Table S-1

Summary of Potential Environmental Impacts and Mitigation Measures, Broadwell Basin Residuals Repository

Issue Category and Potential Impacts	Significance of Impacts	Mitigation Measures	Significance After Mitigation
GEOLOGY			
Proposed Action			
• Possible seismic shaking could damage the Repository liner.	Significant	G-1. The applicant shall design the facility to withstand the forecasted ground shaking.	Not significant
• Possible subsidence could damage the Repository liners.	Not Significant	G-2. The applicant shall install monuments to monitor subsidence.	Not significant
• Potential opening of a large desiccation crack under the Repository could cause failure of the Repository liner allowing leachates or solid hazardous waste to reach groundwater.	Significant	G-3. The applicant shall design the facility to satisfy the minimum subgrade permeability requirements of Chapter 15 ($1x10^{-7}$ cm/sec). See details in Section 4.1.1.3.	Not significant
Alternative 1			
• Impacts similar to those identified for the proposed action.	Significant	• Same as identified for the proposed action.	Not significant
Alternative 2			
• Impacts similar to those identified for the proposed action.	Significant	• Same as identified for the proposed action.	Not significant
Alternative 3			
• Impacts slightly higher with the installation of railroad tracks and transfer-loading facilities.	Significant	• Same as identified for the proposed action.	Not significant
Alternative 4			
• Potential impacts from geologic hazards, such as flooding and desiccation cracks, would be almost similar to those for the proposed action.	Significant	• Same as identified for the proposed action.	Not significant
SOILS			
Proposed Action			
• A total of 977 acres of land would be disturbed by the construction and operations of the proposed facilities. Soil erosion from winds would occur at all project-related sites (Repository, clay and coarse material borrow areas, and access roads), particularly during construction and to a lesser extent during operations.	Not significant	S-1. Moisture content of the soil shall be maintained to meet compaction requirements. S-2. Exposed road surfaces shall be watered or oiled to reduce wind erosion. S-3. Drainages shall be installed to reduce erosion from floods.	Not significant
• The berm protecting the Repository would experience damage from water erosion during floods.	Not significant	S-4. Disturbed areas in and around quarries shall be reshaped and revegetated, where needed, to prevent sheet erosion and wind-blown sediments. S-5. Road to coarse borrow area shall be restored to natural condition in accordance with the plan approved by the BLM. S-6. Reclamation of borrow areas shall be accomplished in accordance with the reclamation plan approved by the County and the BLM.	Not significant

Table S-1, continued

Issue Category and Potential Impacts	Significance of Impacts	Mitigation Measures	Significance After Mitigation
SOILS, continued			
Alternative 1			
• Slight increase in short-term soil erosion potential during construction; all other impacts similar to those identified for the proposed action.	Not significant	• Same as identified for the proposed action.	Not significant
Alternative 2			
• Impacts similar to those identified for the proposed action.	Not significant	• Same as identified for the proposed action.	Not significant
Alternative 3			
• Impacts higher than those identified for the proposed action as a result of new railroad track construction and construction of transfer-loading facitilities.	Not significant	• Same as identified for the proposed action.	Not significant revegetated
Alternative 4			
• Slight decrease in short-term soil erosion potential during construction and a 50 percent decrease in annual disturbance of soils.	Not significant	• Same as identified for the proposed action.	Not significant
HYDROLOGY			
Proposed Action			
• Project facilities could experience damage from inundation by floods within the basin.	Significant	H-1. The applicant shall construct a flood protection berm in accordance with an engineering design approved by the County.	Not significant
• Materials escaping through spills, leaks, overwashing of berms, or rupture could mix with water during storm event and eventually seep into the ground.	Significant	H-2. The applicant shall require termination of all deliveries and transfer all hazardous materials from the support facility area to the Repository when stormwater on lake bed reaches an elevation of 1,305 feet. This action will be taken in accordance with an internal waste relocation plan approved by the Department of Environmental Health Services (DEHS) and the Lahontan Regional Water Quality Control Board (RWQCB).	Not significant
• Escape of hazardous material may occur via desiccation cracks downward to the groundwater table.	Significant	H-3. The applicant shall clean-up any accidental release of hazardous wastes or materials in accordance with a plan approved by the DEHS. H-4. The applicant shall install a groundwater monitoring system to meet the requirements of the RWQCB.	Not significant
Alternative 1			
• Impacts not materially different from those described for the proposed action.	Significant	• Same as identified for the proposed action.	Not significant
Alternative 2			
• Potential from flood damage would slightly increase because a portion of the road will be built within the 100-year flood zone.	Significant	• Same as identified for the proposed action.	Not significant

Table S-1, continued

Issue Category and Potential Impacts	Significance of Impacts	Mitigation Measures	Significance After Mitigation
HYDROLOGY, continued			
Alternative 3			
• Except for a minor increase in runoff along the railroad track, the impacts would be similar to those identified for the Proposed action.	Significant	• Same as identified for the proposed action.	Not significant
Alternative 4			
• Potential for leaching and possible contamination of groundwater slightly reduced.	Significant	• Same as identified for the proposed action.	Not significant
NOISE			
Proposed Action			
• Noise levels resulting from idling trucks at the entrance area would be in the range of 65 of 70 dBA, well above the acceptable limit of 55 dBA.	Significant	N-1. Operations shall be restricted to daylight hours. N-2. Stationary equipment exceeding 70 dBA shall be enclosed.	Not significant
• Noise levels from the operation of the repository, treatment facility, and mining equipment would be greater than 55 dBA in the immediate vicinity of the project sites.	Significant	N-3. Heavy equipment at the project sites shall be fitted with noise control devices to meet County noise regulations.	Not significant
• Noise levels from the project facilities or project-related traffic would not adversely impact the existing noise-sensitive land uses located in Ludlow.	Not significant	N-4. Affected employees shall be provided hearing protection gear.	Not significant
• Audible noise limits would extend three to four miles into adjoining Wilderness Study Areas (WSAs) causing possible disturbance to some recreationists. No important destinations occur in the project vicinity.	Not significant		Not significant
Alternative 1			
• No noticeable change from the proposed action.	Not significant	• Same as identified for the proposed action.	Not significant
Alternative 2			
• Impacts would be almost similar to those identified for the proposed action.	Significant	• Same as identified for the proposed action.	Not significant
Alternative 3			
• An additional source of noise (railroads) would be added to the project area. One to two train trips per day would not substantially change the noise levels identified for the proposed action.	Significant	• Same as identified for the proposed action.	Not significant
Alternative 4			
• Noise levels reduced at project sites and along access roads with the reduction of materials handled.	Not significant	• Same as identified for the proposed action.	Not significant

Table S-1, continued

Issue Category and Potential Impacts	Significance of Impacts	Mitigation Measures	Significance After Mitigation
BIOLOGICAL RESOURCES			
Proposed Action			
• A total of 534 acres of suitable (BLM Category III) desert tortoise habitat would be lost to long term conservation management.	Significant	B-1 through B-12. The applicant shall take all mitigation measures required by the BLM to protect the desert tortoise from project-related activities (see measures B-1 through B-12 in Section 4.1.5.3 for details). The applicant shall also acquire sufficient offsite habitat lands to compensate for the unmitigated impacts at a ratio determined by the BLM.	Not significant
• A total of 977 acres of desert vegetation would be disturbed. No rare, threatened, or endangered plant species would be affected. Loss of cotton top cactus is considered an adverse impact.	Not significant	B-13. Cotton top cacti shall be collected and transplanted to a protected site.	Not significant
• Minor impacts to prairie falcon would occur form removal of foraging habitat. One or two pair of kit foxes with one or two natal dens would be affected. A minor reduction in the number of nesting pairs of LeConte's trasher would occur.	Significant	B-14. Mining activities shall not be initiated between late February and late May if LeConte's thrasher is found nesting in the area. B-15. The coarse borrow site shall be revegetated in accordance with the approved reclamation plan.	Not significant
Alternative 1			
• Impacts slightly higher than those described for the proposed action because of additional 3 to 5 acres of land disturbance.	Significant	• Same as identified for the proposed action.	Not significant
Alternative 2			
• With an increase of about four acres of land disturbance, overall impacts would remain almost similar to those identified for the proposed action.	Significant	• Same as identified for the proposed action.	Significant but unavoidable
Alternative 3			
• With an additional land disturbance of about 40 acres between Ludlow and the project site, biological impacts would be substantially higher than those identified for the proposed action.	Significant	• Same as identified for the proposed action.	Significant but unavoidable
Alternative 4			
• Impacts lower than those described for the proposed action because of reduced land disturbance.	Significant	• Same as identified for the proposed action.	Not significant
CULTURAL AND PALEONTOLOGICAL RESOURCES			
Proposed Action			
• No NRHP-eligible sites were recorded on the surface; potential for buried sites along the Pleistocene lake shore.	Significant	C-1. An archaeologist shall monitor the areas disturbed during construction. If a buried site is found, work shall stop and the BLM and State Historic Preservation Officer shall be consulted for guidance.	Not significant

Table S-1, continued

Issue Category and Potential Impacts	Significance of Impacts	Mitigation Measures	Significance After Mitigation
CULTURAL AND PALEONTOLOGICAL RESOURCES, continued			
• One historic sites (desert training military camp) believed to be eligible for NRHP would be affected.	Significant	C-2. Secondary impacts to the railroad berm shall be minimized by erosion control measures identified in the reclamation plan.	Not significant
• Erosion of the east wall of the clay borrow area could indirectly threaten the Tonopah and Tidewater Railroad berm.	Not significant	C-3. The site of the military camp shall be fenced to minimize potential damage from increased access.	Not significant
• Disturbance of the remnant of a military rock alignment would occur from Crucero Road alignment above the 100-year flood levels.	Significant	C-4. Impacts to Native American resources, if any, shall be mitigated in consultation with tribal representatives.	Not significant
• Eleven fossils were recovered from the site. Potential for additional buried fossils exists.	Significant	C-5. A paleontologist shall monitor the areas disturbed during construction. If significant resources are discovered, they will be excavated prior to any additional construction activity.	Not significant
Alternative 1			
• Impacts slightly higher than those resulting from the proposed action because of increased disturbance.	Significant	• Same as identified for the proposed action.	Not significant
Alternative 2			
• With additional land disturbance, potential for impacts would be higher than that identified for the proposed action.	Significant	• Same as identified for the proposed action.	Not significant
Alternative 3			
• With additional land disturbance, potential for impacts would be higher than that identified for the proposed action.	Significant	• Same as identified for the proposed action.	Not significant
Alternative 4			
• Impacts slightly lower than those resulting from the proposed action because of reduced land disturbance.	Significant	• Same as identified for the proposed action.	Not significant
AIR QUALITY			
Proposed Action			
• Temporary short-term impacts to air quality would occur during construction from equipment exhaust and fugitive dust.	Not significant	A-1. The applicant shall comply with CARB and San Bernardino County APCD standards, rules, and regulations.	Not significant
• PM_{10} fugitive dust emissions from the project would cause violations of both state and federal standards.	Significant	A-2. The applicant shall institute a regular maintenance program for operating equipment.	Significant but unavoidable
• Air toxics emitted from the disposal cells including benzene, toluene, and xylene pose health hazards to workers and residents in the area.	Significant	A-3. Equipment with latest technology shall be used to the extent possible.	Significant but unavoidable

Table S-1, continued

Issue Category and Potential Impacts	Significance of Impacts	Mitigation Measures	Significance After Mitigation
AIR QUALITY, continued			
		A-4. The applicant shall consider transporting of waste from treatment facility to the Repository by conveyor run by electricity.	
		A-5. Fugitive organic evaporative emission shall be controlled through latest available technology.	
		A-6. Fugitive dust from road surfaces shall be controlled by watering, use of chemical suppressant, or by paving.	
		A-7. Fugitive dust in borrow areas shall be controlled by pre-watering the area where necessary.	
		A-8. An air toxics/meteorological monitoring program shall be established to gather data for future risk assessments.	
		A-9. Coarse borrow area shall be revegetated upon completion of mining to control dust.	
Alternative 1			
• Impacts almost similar to those described for the proposed action.	Significant	• Same as identified for the proposed action.	Not significant
Alternative 2			
• Slight increase in air pollution would occur during construction. Overall impacts would not be materially different from those identified for the proposed action.	Significant	• Same as identified for the proposed action.	Significant but unavoidable
Alternative 3			
• Short-term emissions would increase due to construction of railroad tracks. Substantial reductions in emissions would occur from rail haul compared to transportation by trucks. PM_{10} generation would remain similar to the proposed action.	Significant	• Same as identified for the proposed action.	Significant but unavoidable
Alternative 4			
• Impacts substantially lower than those for the proposed action because of reduction in daily handling of waste and elimination of the treatment facility.	Significant	• Same as identified for the proposed action.	Not significant

Table S-1, continued

Issue Category and Potential Impacts	Significance of Impacts	Mitigation Measures	Significance After Mitigation
WATER SUPPLY			
Proposed Action			
• Project would require groundwater pumping at the rate of 275 gallons per minute for one year of project construction and 50 gallons per minute for the project life for operational use. Pumping estimated quantities of groundwater would not permanently deplete local resources.	Not significant	W-1. The applicant shall annually report the volume of water consumed, the groundwater table level, and the amount of precipitation to the County.	Not significant
Alternative 1			
• Impacts similar to those described for the proposed action.	Not significant	• Same as identified for the proposed action.	Not significant
Alternative 2			
• Impacts would be similar to these identified for the proposed action.	Not significant	• Same as identified for the proposed action.	Not significant
Alternative 3			
• Water consumption for dust control will increase during construction of railroad track. Overall impacts would be similar to those identified for the proposed action.	Not significant	• Same as identified for the proposed action.	Not significant
Alternative 4			
• Demand for water substantially reduced because of elimination of the treatment facility and reduction in daily waste handling.	Not significant	• Same as identified for the proposed action.	Not significant
SCENIC/VISUAL RESOURCES			
Proposed Action			
• The project facilities as seen from I-40 near Ludlow (Viewpoints 1 and 2) would be visible but would not attract undue attention.	Not significant	V-1 through V-11. All structures shall be built to minimize visual impacts (see details in Section 4.1.9.3).	Not significant
• The Repository at its maximum height would be highly visible from Viewpoints 3 and 4, but only a limited number of observers would see the development.	Not significant	V-12 through V-16. Contrast in land/water surfaces shall be minimized by using appropriate grading, reducing point erosion, and elevation of Crucero Road only where necessary (see details in Section 4.1.9.3).	Not significant
• The coarse borrow area would be highly visible from Viewpoint 5, but only a limited number of observers will see the borrow area.	Not significant	V-17. Coarse Borrow areas shall be reclaimed as required by the approved reclamation plan. V-18 through V-20. The applicant shall maximize the use of native plants, minimize removal of existing creosote scrub, and revegetate the coarse borrow area in accordance with the approved reclamation plan.	Not significant
Alternative 1			
• Impacts similar to those described for the proposed action.	Not significant	• Same as identified for the proposed action.	Not significant
Alternative 2			
• Elevation of road would increase the impacts slightly over the proposed action.	Not significant	• Same as identified for the proposed action.	Not significant

Table S-1, continued

Issue Category and Potential Impacts	Significance of Impacts	Mitigation Measures	Significance After Mitigation
SCENIC/VISUAL RESOURCES, continued			
Alternative 3			
• Separate alignment of railroad track would change the visual setting in the project area including the affected Wilderness Study areas but overall impacts would not be materially different from the proposed action.	Not significant	• Same as identified for the proposed action.	Not significant
Alternative 4			
• Impacts similar to those described for the proposed action.	Not significant	• Same as identified for the proposed action.	Not significant
TRANSPORTATION/CIRCULATION			
Proposed Action			
• Traffic in the project vicinity would increase by 80 to 200 trucks and 20 passenger vehicles per day. This would not change the level of service on affected highways and roads.	Not significant	• No mitigation required.	Not significant
• Potential for hazardous waste spills from traffic accidents exists but the probability is very low.	Not significant	• No mitigation required.	Not significant
Alternative 1			
• Impacts similar to those identified for the proposed action.	Not significant	• No mitigation required.	Not significant
Alternative 2			
• Impacts similar to those described for the proposed action.	Not significant	• No mitigation required.	Not significant
Alternative 3			
• Project-related truck traffic would be substantially reduced. Increase on railroad traffic would be marginal.	Not significant	• No mitigation required.	Not significant
Alternative 4			
• Impacts substantially reduced because of reduction in daily handling of waste.	Not significant	• No mitigation required.	Not significant
LAND USE			
Proposed Action			
• Proposed facilities would utilize 590 acres of BLM-managed public land (227 acres for clay borrow area, 363 acres for coarse material borrow area). These lands are classified as multiple use Class M (moderate) where mining is allowed.	Not significant	L-1. The applicant shall reclaim coarse and clay borrow area in accordance with an approved reclamation plan. L-2. Applicant shall minimize the land required for road improvements within the WSAs.	Not significant

Table S-1, continued

Issue Category and Potential Impacts	Significance of Impacts	Mitigation Measures	Significance After Mitigation
LAND USE, continued			
• Additional BLM-managed lands (less than 30 acres) in WSA 252, would be disturbed by road improvements.	Significant	L-3. Existing Crucero Road within the airport clear zone shall be excavated to a depth of about 10 feet or relocated in a manner whereby the trucks will comply with the clear zone height restrictions.	Not significant
• Crucero Road and electrical distribution lines encroach upon the height limit of existing clear zone of the airstrip near Ludlow and are inconsistent with Policy AV-1 of the Aviation Safety overlay of the County General Plan.	Significant	L-4. The utility lines within the airport clear zone shall be placed underground or relocated to comply with the clear zone height restrictions.	Not significant
• Existing unpatented mining claims on proposed coarse material and clay borrow areas conflict with the proposal.	Significant	L-5. The applicant shall resolve the existing mining claims issue before a mineral sales could be completed.	Not significant
Alternative 1			
• Impacts slightly lower because road alignments avoid encroachment into the runway clear zone.	Not significant	• No mitigation required.	Not significant
Alternative 2			
• Encroachment into WSA 252 would be substantially reduced but not eliminated.	Significant	• Same as identified for the proposed action.	Not significant
Alternative 3			
• Adidtional encroachment into the wilderness study areas would occur from railroad construction.	Significant	• Same as identified for the proposed action.	Not significant
Alternative 4			
• Impacts almost similar to those described for the proposed action.	Not significant	• Same as identified for the proposed action.	Not significant
PUBLIC HEALTH AND SAFETY			
Proposed Action			
• Individual cancer risk from exposure to benzene and hydrocarbons (1.3 in a million for a 20-year exposure and 4.6 in a million for a 70-year exposure) would exceed one in a million criterion for significance.	Significant	P-1. A vapor suppressing foam or its equivalent shall be applied over the waste as it is placed in the Repository. Stabilized foam can suppress organic vapor emissions at 80 to 90 percent effectiveness for several days.	Not significant
• Approximately 2.5 traffic accidents may be expected over a 50-year period.	Not significant	P-2. An air toxics sampling program shall be conducted to determine air toxics concentrations in the Ludlow area.	Not significant
		P-3. The applicant shall contribute to an emergency response unit in Newberry Springs.	
		P-4. The applicant shall maintain cleanup capability at the site to handle spills on its property.	
		P-5. Normal industrial health and safety practices shall be employed in the operations of the Repository.	

Table S-1, continued

Issue Category and Potential Impacts	Significance of Impacts	Mitigation Measures	Significance After Mitigation
PUBLIC HEALTH AND SAFETY, continued		**P-6. The borrow site shall be reclaimed in accordance with an approved reclamation plan to mitigate public safety concerns.** **P-7. The applicant shall submit a spill prevention contingency/business plan to the County.**	
Alternative 1			
• Impacts similar to those described for the proposed action.	**Significant**	**• Same as identified for the proposed action.**	**Not significant**
Alternative 2			
• Impacts similar to those described for the proposed action.	**Significant**	**• Same as identified for the proposed action.**	**Not significant**
Alternative 3			
• Impacts almost similar to those described for the proposed action.	**Significant**	**• Same as identified for the proposed action.**	**Not significant**
Alternative 4			
• Maximum individual cancer risk similar to that identified for the proposed action. Slightly increased possibility of health hazard from illegal dumping.	**Significant**	**• Same as identified for the proposed action.**	**Not significant**

1.0 INTRODUCTION, PURPOSE, AND CEQA/NEPA COMPLIANCE

1.0 INTRODUCTION, PURPOSE, AND CEQA/NEPA COMPLIANCE

1.1 INTRODUCTION

The Broadwell Corporation (the proponent) proposes to construct a Specified Hazardous Waste Facility, to be called the Broadwell Basin Residuals Repository, in an undeveloped dry lake basin approximately eight and one-half miles north of Ludlow, California. A Residuals Repository is a landfill developed to dispose of the end products or residuals remaining after treatment of hazardous wastes. The Broadwell facility would consist of approximately 316 acres of aboveground disposal area on Broadwell Dry Lake, as well as support laboratory, maintenance, and treatment structures on an adjacent alluvial fan, and 590 acres of borrow area. Approximately eight and one-half miles of paved road would be constructed from Ludlow to the site. The mound created by the materials placed in the disposal area would eventually rise 130 feet from the playa surface.

The County of San Bernardino (the County), as the lead agency under the California Environmental Quality Act (CEQA), and the Bureau of Land Management (BLM), as the federal lead agency under the National Environmental Policy Act (NEPA), have authorized the preparation of this Environmental Impact Report/Environmental Impact Statement (EIR/EIS) to assess the potential environmental effects of the project. Other objectives of the EIR/EIS are to: (1) indicate the manner in which those effects can be mitigated or avoided, and (2) identify any alternatives to the proposed action.

1.2 PURPOSE AND NEED

In May 1990, EMCON Associates prepared a *Needs Assessment for the Broadwell Basin Residuals Repository*. The document was based on a review of existing publications prepared by regulatory agencies and on the most currently available data regarding hazardous waste generation and disposal. The review identified the following deficiencies in the hazardous waste management facilities capacity:

- In San Bernardino County, a deficiency of about 13,000 tons per year of stabilization capacity and 28,000 tons of disposal capacity;

- In the eight-county Southern California region, a deficiency of approximately 93,000 tons per year of stabilization capacity and 265,000 tons per year of disposal capacity; and

- In California, a deficiency of almost 136,000 tons per year of stabilization capacity and 604,000 tons per year of disposal capacity.

These figures support the need for additional stabilization and residuals repository facilities. The Broadwell Corporation proposes to meet a portion of this need by constructing and operating the Broadwell Basin Residuals Repository in San Bernardino County. The facility would accept, treat, and dispose of solid hazardous wastes and other solid wastes that either meet or will be treated to meet the state and federal treatment standards. Solid wastes are defined as those wastes that pass an Environmental Protection Agency (EPA) test (EPA SW-846 Method 9095, Paint Filter Liquids Test), which is the industry standard for identifying a solid waste. The wastes that would be accepted for treatment at the proposed facility include metal-contaminated solid waste residues (sludges and filter press cakes) and contaminated soils. The proposed treatment consists of a stabilization process that minimizes the leaching potential of metals and an organic soil treatment process that removes contaminants from the soil. No liquids would be accepted at the facility.

1.3 SCOPE OF THE EIR/EIS

In June 1988, the Broadwell Corporation submitted a Notice of Intent to the State of California to apply for a specified hazardous waste facility project. A pre-application meeting with the San Bernardino County staff was held in July 1988. In August 1989, an application was submitted to San Bernardino County for a General Plan Amendment and Conditional Use Permit to construct a Specified Hazardous Waste Facility to be called Broadwell Basin Residuals Repository. The County, in October 1989, completed an Initial Study and determined that an EIR must be prepared to comply with CEQA requirements. A Notice of Preparation (NOP) of an Environmental Impact Report and Public Scoping Meeting was circulated on October 17, 1989, to all responsible agencies and interested citizens and groups. A post-application public meeting was held on November 1, 1989, in Newberry Springs, California, to identify the issues and concerns to be included in the scope of the EIR. In September 1990, the Broadwell Corporation submitted to the BLM an application for a right-of-way to the project site for access and utilities, and applications to purchase mineral materials. The BLM published a Notice of Intent (NOI) to prepare an EIS in the *Federal Register* on November 5, 1990. Because some of the involved public lands are Wilderness Study Areas (WSA), the BLM also prepared a Notice of Proposed Action (NOPA) Lands Under Wilderness Review, which was mailed to a standard list of interested parties. The County and the BLM signed a Memorandum of Understanding in September 1990 to prepare a joint EIR/EIS, which complies with both CEQA and NEPA requirements. The public scoping meeting held under the County's NOP in November 1989, as well as the responses to the NOI and NOPA, and the ongoing Local Advisory Committee (LAC) meetings, were determined to meet NEPA scoping compliance.

The Initial Study, the responses to the NOP and NOI, and the comments received during public scoping have defined the scope of this EIR/EIS. The Initial Study recommended that the following issues be addressed: geologic hazards, flood hazards, wind/erosion, noise, hazardous materials, biological resources, cultural/paleontological resources, air quality, water supply/water quality, scenic/visual resources, soil engineering properties, transportation/circulation, and land use. These issues, along with responses and comments from the public and LAC, have been grouped into the following issue categories or resources for the convenience of discussion in the EIR/EIS:

- Geology (includes geologic hazards);
- Soils (includes wind/erosion and soil engineering properties);
- Hydrology (includes flood hazards);
- Noise;
- Biological resources;
- Cultural and paleontological resources;
- Air quality;
- Water supply;
- Scenic/visual resources;
- Transportation/circulation;
- Land use; and
- Public health and safety (includes hazardous materials).

In addition, the EIR/EIS contains all sections required by CEQA and NEPA.

1.4 RELATIONSHIP TO SAN BERNARDINO COUNTY/BUREAU OF LAND MANAGEMENT POLICIES, PLANS, AND PROGRAMS

1.4.1 San Bernardino County

The proposed facility must be in full compliance with the San Bernardino County Hazardous Waste Management Plan (CHWMP), as well as the General Plan. A significant aspect of the CHWMP as it pertains to Broadwell Corporation's application is that it establishes siting criteria for identifying a specified hazardous waste facility site. The CHWMP requires that an applicant demonstrate consistency with the siting criteria and policies of the plan in order to receive approval. As discussed further in Appendices D and E of this EIR/EIS, the proposed project is consistent with the County's CHWMP siting criteria. The CHWMP also establishes a local application review process to ensure procedural compliance with state and local regulations, including the "Tanner Bill." By complying with the CHWMP siting criteria and following the application procedure, the proponent can comply with the intent and substance of the Tanner Bill, state laws regarding siting, and the County General Plan.

The proposed facility will be required to comply with the General Plan through the adoption of an amendment and preparation of an overlay designating the use.

The two borrow sites will also require approval of a reclamation plan under the California Surface Mining and Reclamation Act (SMARA) of 1975, as amended. A reclamation plan was filed by the proponent with the County of San Bernardino on April 9, 1991.

1.4.2 Bureau of Land Management

The Broadwell Corporation has applied to the BLM to construct and operate two borrow sites (one for coarse materials, such as aggregate and gravel, and the other for clay material) at sites located on public land close to the proposed Repository site. The aggregate and clay materials mined at the two sites will be purchased by the proponent from BLM. The two sites are subject to the policies of the California Desert Conservation Area (CDCA) Plan of 1980 and the material sales regulations (43 CFR Part 3600). The plan was prepared to meet the requirements of the Federal Land Policy and Management Act (FLPMA) of 1976 (43 U.S.C. para. 1701 et seq.). It calls for public lands to be protected and managed within the framework of a program of multiple use and sustained yield, and the maintenance of environmental quality. The proposed borrow sites are located on lands designated as Multiple Use Class M (Moderate), which provides for a variety of uses, including mining, but is designed to conserve desert resources and to mitigate damage to those resources which the permitted uses may cause.

In addition to the borrow sites, the proposed project requires improvement of the existing Crucero Road and realignment of a portion of Crucero Road above the 100-year flood levels. These actions would require a right-of-way grant and disturbance of lands within the WSAs which are managed according to the *Interim Management Policy (IMP) and Guidelines for Lands Under Wilderness Review*. The application of the "non-impairment" standard is central to the management of WSAs. Until Congress acts on the designation of wilderness, WSAs are managed so as to prevent impairment of an area's suitability for preservation as wilderness. New rights-of-way may be approved that do not satisfy the non-impairment criteria if the BLM has determined that the application of the non-impairment standard would unreasonably interfere with the enjoyment of the landowner's rights. In each case, the BLM's decision depends upon the nature of the rights conveyed and the site-specific conditions involved. The BLM is required, by law, to provide such access as is adequate to secure the landowner the reasonable use and enjoyment of non-federally owned land which is completely surrounded or isolated by public lands administered under FLPMA. In determining adequate access, the BLM has discretion to evaluate such things as proposed construction methods and location, to consider reasonable alternatives, and to protect the public interest. Reasonable use and enjoyment may be some lesser degree of reasonable access. The BLM, however, must provide a degree of access that is commensurate with the reasonable use and enjoyment of the non-federal land.

In summary, the proposed portion of the project under BLM jurisdiction must conform with the CDCA plan, FLPMA, material sales regulations (43 CFR Part 3600), right-of-way regulations (43 CFR Part 2800), and the *IMP and Guidelines for Lands Under Wilderness Review.*

1.5 USE OF THE EIR/EIS

1.5.1 County of San Bernardino

This document will be used by the County Planning Commission and Board of Supervisors, along with other information, in their consideration of the application for a General Plan Amendment and issuance of a Conditional Use Permit to construct the proposed facility, and their review of the SMARA Reclamation Plan for the two borrow sites. For this purpose, the County is the lead agency for CEQA compliance. All feasible mitigation measures identified in the EIR/EIS will be included as conditions of the project, if approved.

1.5.2 Bureau of Land Management

The BLM will use this EIR/EIS, along with other information, in its discretionary consideration of the proposed construction and improvement of the access road to the project site and the use of borrow areas. For this purpose, BLM is the federal lead agency for NEPA compliance.

1.5.3 Other Agencies

Other permits and approvals by local, state, and federal agencies would be needed to construct and operate the proposed facility. A list of the major permits and approvals that may be required for the Broadwell Basin Residuals Repository project is presented in Table 1.5-1. These agencies will use this document in their consideration of these permits. All agencies will independently review and use this EIR/EIS in their decision-making processes.

Table 1.5-1

Permits and Consultations Potentially Required for the Broadwell Basin Residuals Repository

1. County of San Bernardino	• Conditional Use Permit • General Plan Amendment (Specified Hazardous Waste Facility Overlay designation) • Special Use Permit (Department of Environmental Health Services) • Grading Permit • Building Permits • Underground Storage Tank Permits (possible) • Subsurface Disposal System Permit • Site Reclamation Plan under SMARA
2. Bureau of Land Management	• Right-of-Way/Easement Permit (Crucero Road telephone and power lines) • Coarse/Fine Material Borrow Site Permits with mining/reclamation plan
3. Regional Water Quality Control Board, Lahontan Region	• Waste Discharge Permit
4. Department of Health Services/ Environmental Protection Agency	• Hazardous Waste Facility Permit, closure/post-closure plan • Part B Permit
5. San Bernardino County Air Pollution Control District	• Permit to Construct • Permit to Operate
6. Occupational Safety and Health Administration	• Compressor Permit(s) • Generator Permit(s)
7. U.S. Army Corps of Engineers	• Section 404 Permit
8. California Department of Fish and Game	• Streambed Alteration Agreement
9. State Historic Preservation Officer	• Cultural Resource Consultations
10. Mine Safety and Health Administration	• Emergency fire, evacuation, and rescue plans

2.0 DESCRIPTION OF THE PROPOSED ACTION AND ITS ALTERNATIVES

2.0 DESCRIPTION OF THE PROPOSED ACTION AND ITS ALTERNATIVES

2.1 INTRODUCTION

The Broadwell Corporation proposes to construct a Specified Hazardous Waste Facility, known as the Broadwell Basin Residuals Repository, on Broadwell Dry Lake near Ludlow, California, in the central section of San Bernardino County. Details of the proposed action and its alternatives are discussed in the subsequent sections of this chapter. The project description provided represents the extent and location of activities that would take place at the site in order to implement the proposed project. Alternatives to the proposed action have been identified in accordance with National Environmental Policy Act (NEPA) and California Environmental Quality Act (CEQA) guidelines. Potential alternatives were explored and developed based upon the agencies' review of the proponent's site-selection process, and for methods and means to reduce potential environmental effects. Feasible alternatives which could meet the objectives of the proposed action to a large degree are further considered in this document. Alternatives determined to be infeasible were eliminated from further discussion. The four feasible alternatives analyzed include: (1) the use of a different alignment of Crucero Road near Interstate 40 in Section 5, (2) the improvement of the existing Crucero Road, (3) rail haul of waste to the site, and (4) construction of the Repository without treatment facilities. The required No-Action alternative is also described in this document.

2.2 PROPOSED ACTION

The proposed action is to construct a specified hazardous waste facility with a capacity of disposing approximately 16 million tons of treated hazardous waste. The aboveground Repository would reach a height of 130 feet over an area of approximately 200 acres and utilize clays and plastic to cover and confine the waste. The proposed action also includes construction of a waste treatment area and site support facilities covering approximately 116 acres, construction of a two-lane paved access road within a 60-foot-wide right-of-way along the existing Crucero Road alignment for approximately 6 miles from the Interstate 40 intersection, construction of a new road above the 100-year floodplain west of the existing Crucero Road alignment for approximately two and one-half miles, installing utilities to the site, the widening to 30 feet of an existing two-mile dirt road to access a proposed coarse and aggregate materials site where approximately 10.4 million tons would be removed, and the mining of approximately five and one-half million tons of clay material.

Depending on the daily flow of waste to the Repository, the expected life of the facility is estimated to be roughly between 20 and 50 years. The Repository is planned to accept 2,000 tons of waste per day (626,000 tons per year assuming 313 working days per year). With the estimated disposal capacity shortfall of the Southern California region of approximately 265,000 tons per year (less than 1,000 tons per day), the proposed facility can accept waste for a period of over 50 years. The use of a planned disposal rate of 2,000 tons per day in the proposed action (reflecting a facility life of over 20 years) allows evaluation of maximum environmental impacts resulting from the construction and operation of the facility and identification of appropriate mitigation measures to eliminate or reduce adverse impacts. A lower and more likely disposal rate of 1,000 tons per day is assumed for the analysis of Alternative 4, Repository without onsite treatment facilities.

A description of the proposed site, project facilities, and the operations of the facility is given in the following sections.

2.2.1 Project Site Description

The proposed Broadwell Basin Residuals Repository would be located in the Broadwell Dry Lake Basin near the town of Ludlow in the central section of San Bernardino County, about 60 miles east of Barstow, California (Figure 2.2-1). The major access route to the site is Interstate 40. The Repository would be directly accessed from Crucero Road, an unimproved County road that connects to a diamond interchange on Interstate 40 at Ludlow.

The Repository site would occupy the eastern portion of Section 25, Township 9 North, Range 7 East in the County of San Bernardino, California (Figure 2.2-2). Clay material would be mined from the western portion of Section 30, east of and adjacent to the Repository site, for the construction and operation of the Repository. An area northwest of the Repository site located in three sections (Sections 14, 23, and 24) would be utilized as a coarse and aggregate borrow area (Figure 2.2-2). The Repository is planned on the west-central part of the Broadwell Dry Lake, where the naturally occurring clay deposits are 150 feet deep and groundwater is approximately 80 feet below the surface. The clay bed, in addition to the double liner design for the facility, is intended to provide an additional barrier to leachate releases to the groundwater. The Repository is proposed to be sited within the 100-year floodplain. Broadwell Dry Lake is the receiving body for all runoff generated within the 156,000-acre watershed. Regulations for projects within 100-year floodplains require the facility to be engineered to protect against such an event [40 CFR 270.14 (b)(ii)(iv)]. This engineering would be provided by the construction of a surrounding earth berm, which would be 35 feet high and 230 feet wide. Similarly, Crucero Road improvements are designed to accommodate 100-year flood constraints. This engineered plan conforms to the applicable federal Environmental Protection Agency (EPA) and California Department of Health Services (DHS) requirements for a facility of this type.

2.2.2 Project Facilities Description

Development of the site includes improving Crucero Road, and constructing the entrance, treatment, and support facilities, and Residuals Repository. All earthfill, aggregate, clay soil, and drain rock materials required for construction would be obtained from onsite or nearby clay and coarse borrow

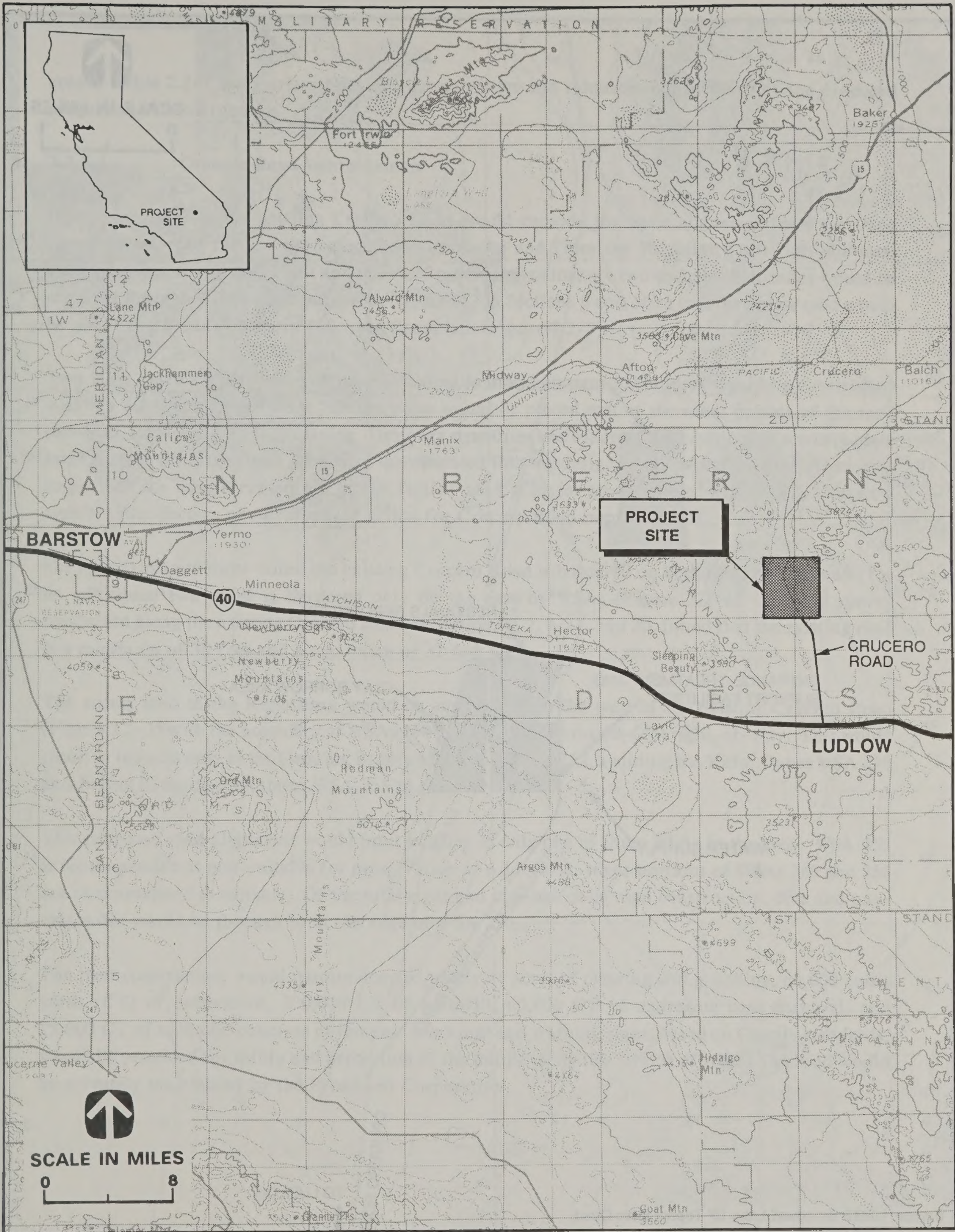
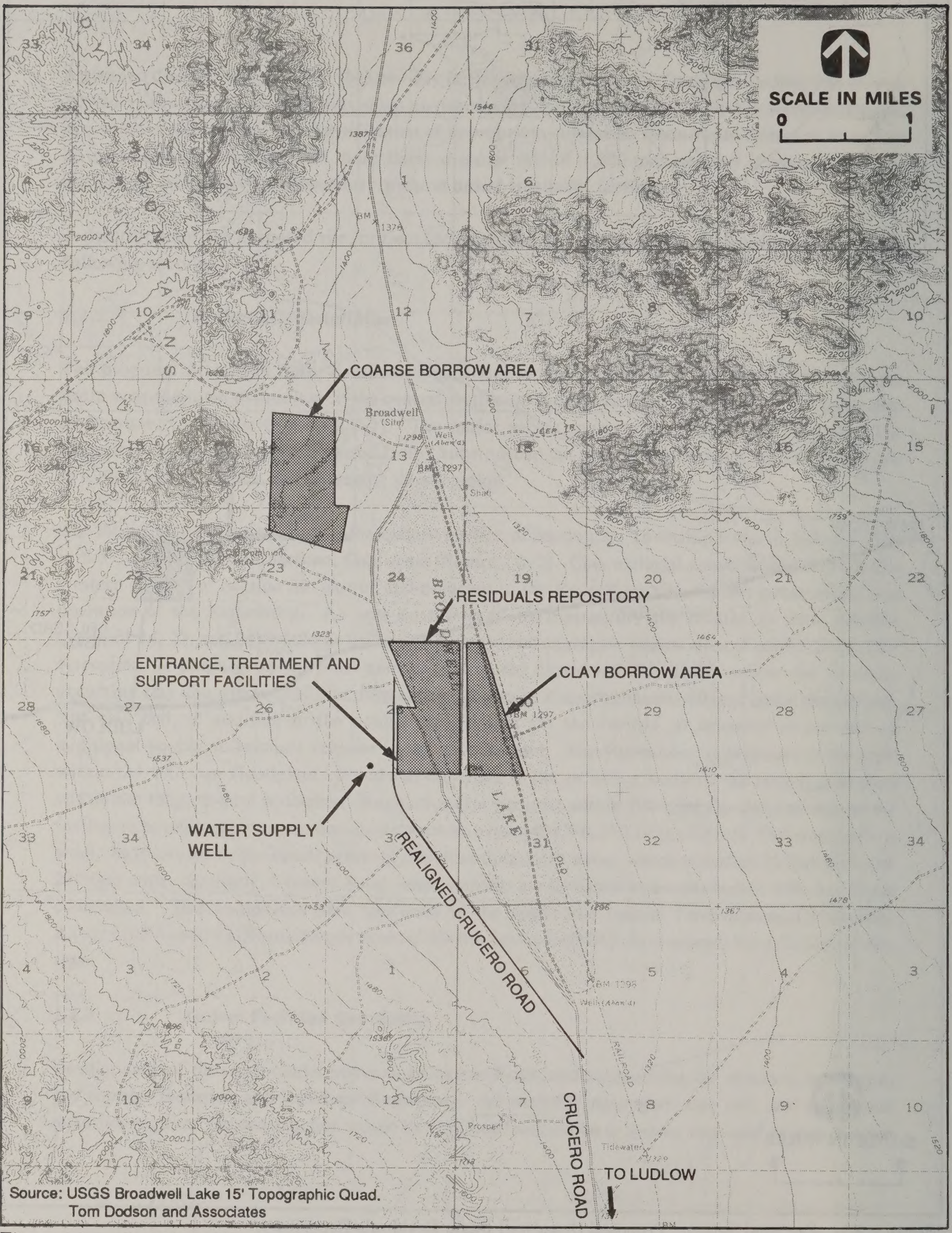


Figure 2.2-1 Regional Setting, Proposed Broadwell Basin Residuals Repository, San Bernardino County, California



Source: USGS Broadwell Lake 15' Topographic Quad.
Tom Dodson and Associates

Figure 2.2-2 Location of Proposed Facilities and Activity Sites, Broadwell Basin Residuals Repository, San Bernardino County, California

areas. Table 2.2-1 summarizes selected characteristics and resource requirements of the proposed project and its alternatives.

2.2.2.1 Crucero Road Improvements

From Interstate 40, the existing Crucero Road would provide the basic alignment for a two-lane paved access road for the projected truck traffic to and from the Repository site. Of the total distance of approximately eight and one-half miles, approximately two and one-half miles would be rerouted through Wilderness Study Area (WSA) 252 in Sections 6 and 36 so that the access road would be above the Broadwell Basin 100-year floodplain (Figure 2.2-2).

Two lanes (each 13 feet wide) of paved road with five-foot paved shoulders would be constructed within a 60-foot right-of-way. Utility poles would be placed east of the road, outside of the road shoulder, at 200- to 250-foot spacing. Drainage structures and roadway dip crossings to accommodate large surface drainage flows have been incorporated into the design of the access road improvements to provide for uninterrupted use of the facility after a major storm event. Figure 2.2-3 shows a typical cross-section of the proposed action for Crucero Road improvements.

For approximately three miles, the existing Crucero Road is bordered on both sides by WSAs and for an additional two miles is bordered only on the east by WSAs (Figure 2.2-4). A field survey conducted along the existing Crucero Road in Sections 6, 7, 8, 17, and 20, found that the existing road is a minimum of 30 feet and a maximum of 32 feet wide.

The access road to the Repository would be constructed to the west of the existing Crucero Road (Figure 2.2-3) with the boundary of WSAs 250 and 256 outside the 60-foot right-of-way. This would result in impacts only to the Sleeping Beauty Mountains WSA 252, avoiding the Kelso Dunes WSA 250 and Bristol/Granite Mountains WSA 256 to the east.

This proposed road alignment would limit impacts to only one of three WSAs in the area. WSA 252 is recommended as non-suitable for preservation as wilderness, while portions of WSAs 250 and 256 are recommended as suitable. Of the total eight and one-half mile road construction, five and one-half miles would be through or at the edge of WSA 252.

The road construction would require approximately 64 acres of clearing and grubbing, 60,000 cubic yards (CY) of excavation, 300,000 CY of earthfill, 60,000 CY of aggregate base material, and 25,000 CY of asphaltic concrete pavement. Markings and warning signs, based on County standards, would be provided for safety and protection of the public using this stretch of road. The road would be privately maintained by the Broadwell Corporation.

Table 2.2-1

Broadwell Basin Residuals Repository
Project Characteristics and Resource Requirements

	Activities	Units	Proposed Action	Alternative 1 (Road Realignment)	Alternative 2 (Existing Crucero Road)	Alternative 3 (Rail-Haul)	Alternative 4 (Repository Without Treatment)
1.	Total Project Area	Acres	977	980-982	976	999	957
	• Repository and Associated Facilities	"	316	316	316	316	296
	• Road Improvement (including Coarse Borrow Area Access Road)	"	71	74-76	75	71	71
	• Coarse Borrow Area	"	363	363	363	363	363
	• Clay Borrow Area	"	227	227	227	227	227
	• Rail Right-of-Way	"	0	0	0	22	0
2.	Length of Road Improvement	Miles	8.5	9.3-9.5	8.5	8.5	8.5
3.	Length of Railroad	Miles	0	0	0	9.0	0
4.	Finished Repository Height	Feet	130	130	130	130	130
5.	Flood Protection Berm	Feet	35'high/ 230'wide	35'high/ 230'wide	35'high/ 230'wide	35'high/ 230'wide	35'high/ 230'wide
6.	Waste to be Accepted	Tons/Day	2,000	2,000	2,000	2,000	1,000
7.	Waste to be Treated	Tons/Day	1,000	1,000	1,000	1,000	0
8.	Repository Capacity	Million Tons	16	16	16	16	16
9.	Repository Active Life	Years	20	20	20	20	50
10.	Truck Traffic (10-25 ton/truck)	Number/Day	80-200	80-200	80-200	16-40	40-100
11.	Electric Consumption	kWh/Year	1.7 Million	1.7 Million	1.7 Million	1.7 Million	1.0 million
12.	Emergency Generator Capacity	kW	250	250	250	250	250
13.	Water Requirements	Gallons/day	70,000	70,000	70,000	70,000	30,000
	• Treatment Process	Gallons/day	40,000	40,000	40,000	40,000	0
	• Decontamination	Gallons/day	7,500	7,500	7,500	7,500	7,500
	• Dust Control	Gallons/day	20,000	20,000	20,000	20,000	20,000
	• Domestic Use	Gallons/day	2,500	2,500	2,500	2,500	2,500
14.	Number of Employees (operations)	Number	35-45	35-45	35-45	40-50	30-40
15.	Employees, Inspectors, Visitors	Number/Day	60	60	60	65	55
16.	Construction Personnel (Peak)	Number	100	100	100	120	100

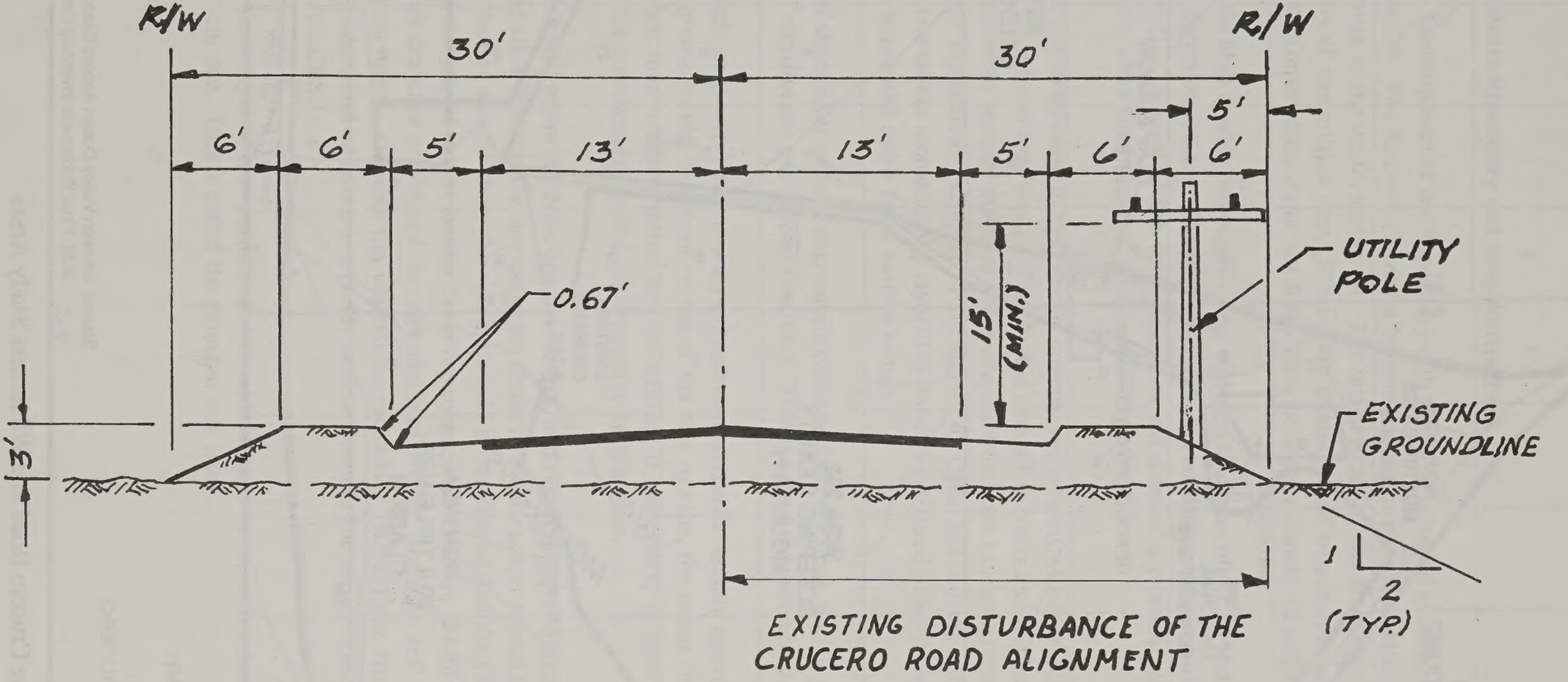
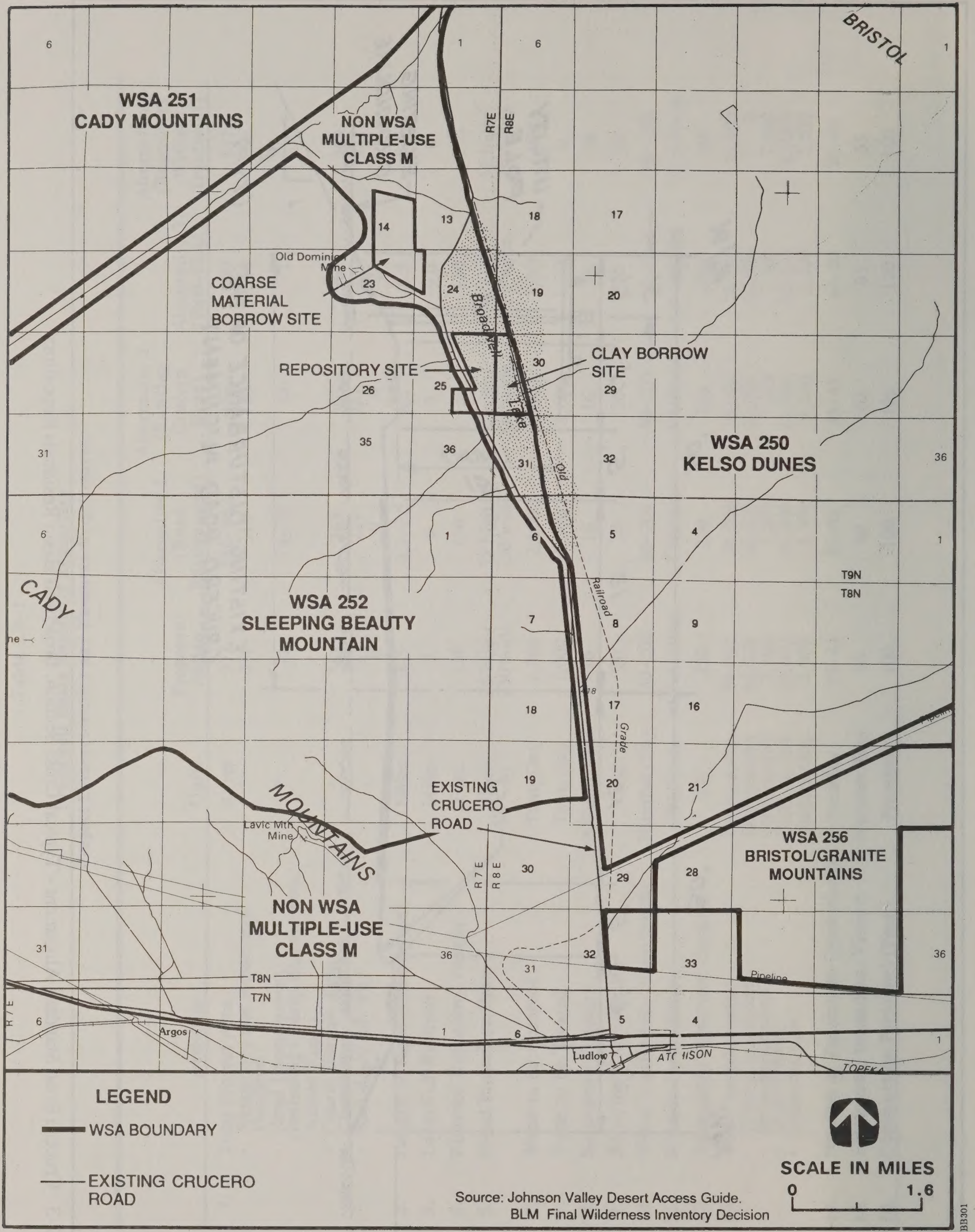


Figure 2.2-3 Crucero Road Standard Alignment - Typical Cross Section, Broadwell Basin Residuals Repository



Source: Johnson Valley Desert Access Guide.
BLM Final Wilderness Inventory Decision

Figure 2.2-4 Existing Crucero Road and Wilderness Study Areas

2.2.2.2 Residuals Repository and Evaporative Tank

Residuals Repository. Development of the Repository cells would be initiated at the southeastern corner of the site in Section 25. The Repository would be constructed in phases, starting at the southeast corner and progressing to the north/northwest. The initial phase of the Repository would have an approximate capacity of one million tons. Subsequent phases would be constructed over the life of the project, with an ultimate capacity of the Repository of approximately 16 million tons.

The Repository would have double composite liners with two leachate collection and removal systems (LCRSs) and a leak detection system. The Repository would resemble a 130-foot high dirt hill, with very consistent lines (i.e., it would have continuous straight sides of a constant slope angle). The completed Repository, after final grading, is shown on Figure 2.2-5.

The liner system is a key component of the various intertwined systems which provide for protection of the environment from hazardous wastes. The double composite liners and leachate collection and removal systems themselves include multiple redundancies which are twice that which are required by state and federal regulations for Class I facilities [40 CFR 264.301(c)]. The Repository's underlying liner system would include many layered systems. Construction would involve layer-by-layer placement, in sequential order from bottom to top:

- A three-foot thick layer of low-permeability compacted clay liner, with a permeability less than 1×10^{-7} centimeters per second (cm/sec). This is called the secondary clay liner.

- A 60-mil thick (or greater) high density polyethylene (HDPE) flexible membrane liner. This thick black plastic would be placed on top of the clay in rolls, the seams "welded" together, and each seam then vacuum tested and re-welded, if necessary, to confirm 100 percent integrity. This membrane is called the secondary HDPE liner.

- A LCRS drainage system for detecting, collecting, and removing any liquids. This drainage system would allow transport of any collected fluids down the gently sloped secondary HDPE liner to a collection sump, where the volume would be monitored and the fluids pumped off via a pipe to the top of the perimeter berm for subsequent disposal. Fluid transport would occur through drainage gravel and through sheets of HDPE "drainage net" material. These drainage layers merely separate the underlying secondary HDPE liner from the overlying primary clay liner, and allowing any fluids to flow down to the sump. This system is called the secondary LCRS.

- An 18-inch thick layer of low-permeability compacted clay liner, with a permeability of less than 1×10^{-7} cm/sec. This is called the primary clay liner.

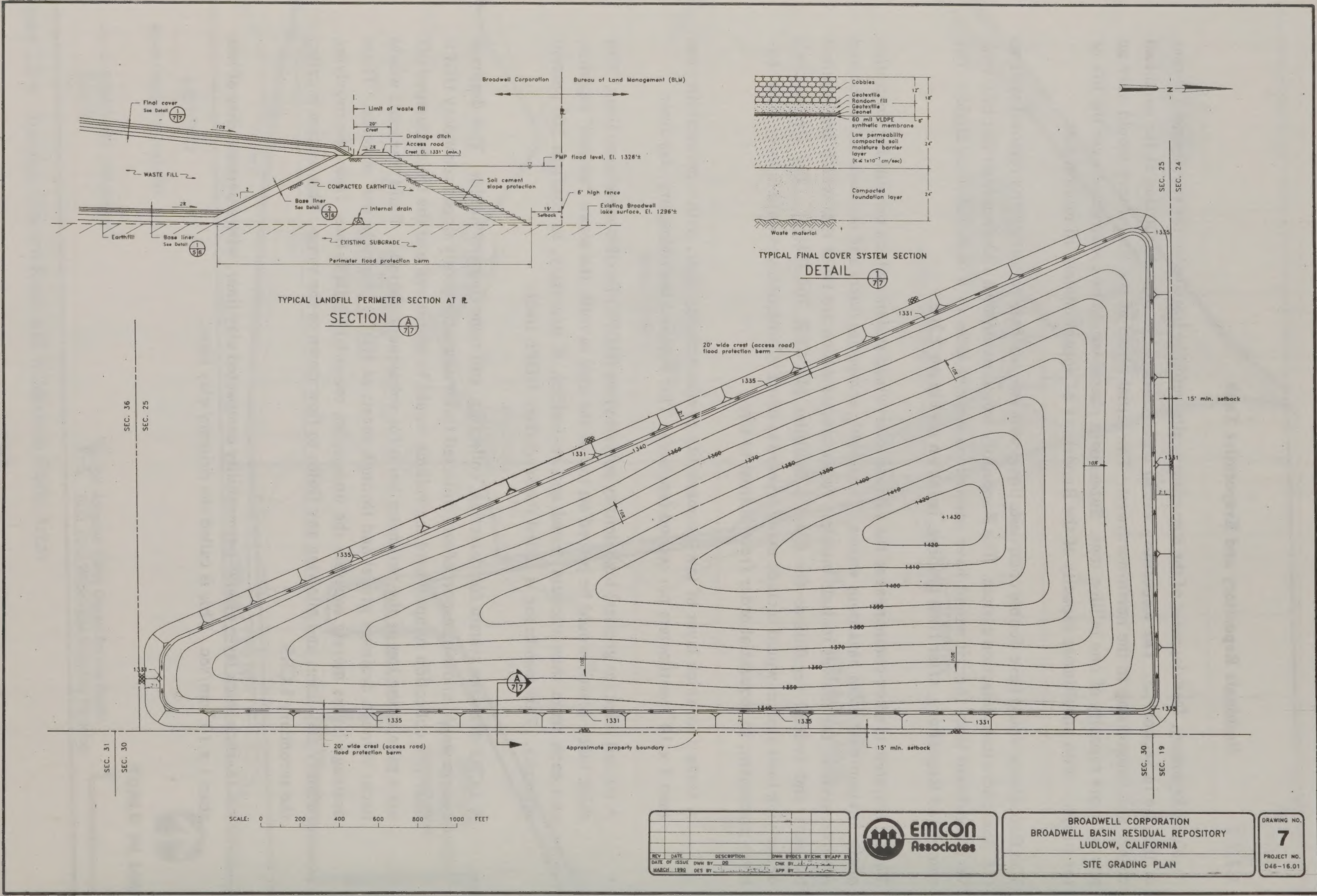


Figure 2.2-5 Site Grading Plan, Completed Broadwell Basin Residuals Repository, San Bernardino County, California

- A 60-mil thick (or greater) HDPE flexible membrane liner. This is called the primary HDPE liner.
- A LCRS drainage system for detecting, collecting, and removing any liquids. This is called the primary LCRS.
- A protective operations layer of soil to prevent damage to the underlying liner systems by heavy equipment.

Waste would then be placed on top of the above liner system. Accordingly, if contaminants were to migrate downward out of the Repository, there must first be some liquid in the waste to provide a transport media for the contaminants (note that the facility would not accept liquid wastes; only solid wastes would be accepted). Next, the contaminated fluid must then get past two clay liners, two HDPE liners, and two LCRS liquid removal systems.

The Repository would also include vadose zone monitoring systems. These systems monitor the uppermost portion of the 80-foot-thick zone of dry clay under the Repository and above the groundwater. The vadose zone monitoring system would consist of both neutron probes and lysimeters, placed underground (through a drill hole) under each of the secondary LCRS sumps. These devices each detect any "wetting front" of moisture being introduced into the dry vadose zone. They would be located under the secondary LCRS sumps because these are the points of fluid collection and would thus be the first and most likely locations for any migrating liquids to occur. The vadose zone monitoring is designed to detect leaks before they have the opportunity to migrate downward to groundwater, and thus allow timely remediation of the contaminants.

Finally, the Repository also would include a groundwater monitoring system. This would consist of several water wells, located "downgradient" of the Repository's groundwater flow direction. These wells would be installed prior to operation with a drill rig. The groundwater monitoring wells would be sampled quarterly, with the samples analyzed in a laboratory for a variety of hazardous constituents. The analyses would show if Repository activities have migrated through the vadose zone to affect groundwater, and would thus allow remediation of that water before it could travel and exacerbate any environmental impacts.

The perimeter berm surrounding the Repository cells is designed to protect the waste fill from inundation resulting from the probable maximum precipitation (PMP) flood event at the project site. California regulations require this more stringent PMP flood protection for land disposal activities [23 CCR 2546 (a)], while they generally require the usual strict 100-year flood protection for all other hazardous waste management activities [22 CCR 66391(a)(ii)(c)]. The outboard side of the flood protection berm would be constructed of a soil-cement admix material for armoring against potential wave and wind erosion.

The construction of the initial phase of the Repository would require 15 acres of HDPE liner material, 290,000 CY of compacted clay, 20,000 CY of granular drainage material, 800,000 CY of earthfill, and 110,000 CY of soil-cement mixture.

The Repository would be lined and filled starting at the southeast end and progressing to the north and west. Initially, the entire 16-million-ton Repository footprint would not be encircled by flood protection berms, only the first one-million-ton phase would be protected. As subsequent phases are developed, however, the flood protection berms will be extended northward and the liner systems installed one phase ahead of the active Repository phase. The unfilled lined Repository phase may also function as a holding pond for uncontaminated surface runoff collected from the slopes of the active Repository phase. Contaminated runoff collected from the waste phase would be pumped out and discharged into the evaporative tank for evaporation. The completed Repository is estimated to cover (not including the adjacent evaporative tank) approximately 200 acres.

Evaporative Tank. The evaporative tank would be utilized to evaporate the surface runoff collected from the active face of the waste fill, any collected leachate, and contaminated water from the waste treatment area and the decontamination station. The evaporative tank would be bermed within secondary containment designed to protect against overtopping by the 100-year flood. The holding capacity of the tank would accommodate the 100-year, 24-hour runoff volume from the active face of the waste fill, the wastewater from decontamination areas, any leachate collected from the Repository and treatment areas, and the direct precipitation on the surface of the tank resulting from a 100-year, 24 hour storm.

The tank would be constructed of steel and would have a leak detection system. The tank capacity is estimated to be roughly 750,000 gallons. It would be open top (to allow for evaporation), but would be netted to protect migratory birds. The leak detection system would include placement of the tank on a gently sloped concrete pad cut with small "star" grooves (or similar) which allows ready flow of any leaking fluids out from under the tank, combined with a 365-days-per-year tank leak visual inspection program. The tank would be less than 20 feet high.

2.2.2.3 Entrance, Treatment, and Support Facilities

The entrance, treatment, and support facilities would be located on contiguous areas as shown on Figure 2.2-6. Area preparation would involve placement of a perimeter 100-year flood protection berm, aggregate base, and asphaltic concrete pavement. The area within the protection berm is estimated to cover approximately 116 acres.

Entrance Area. The entrance area would provide space for incoming waste trucks, confirming hazardous waste loads, and directing incoming and outgoing waste trucks (Figure 2.2-7). The facilities associated with the entrance area include:

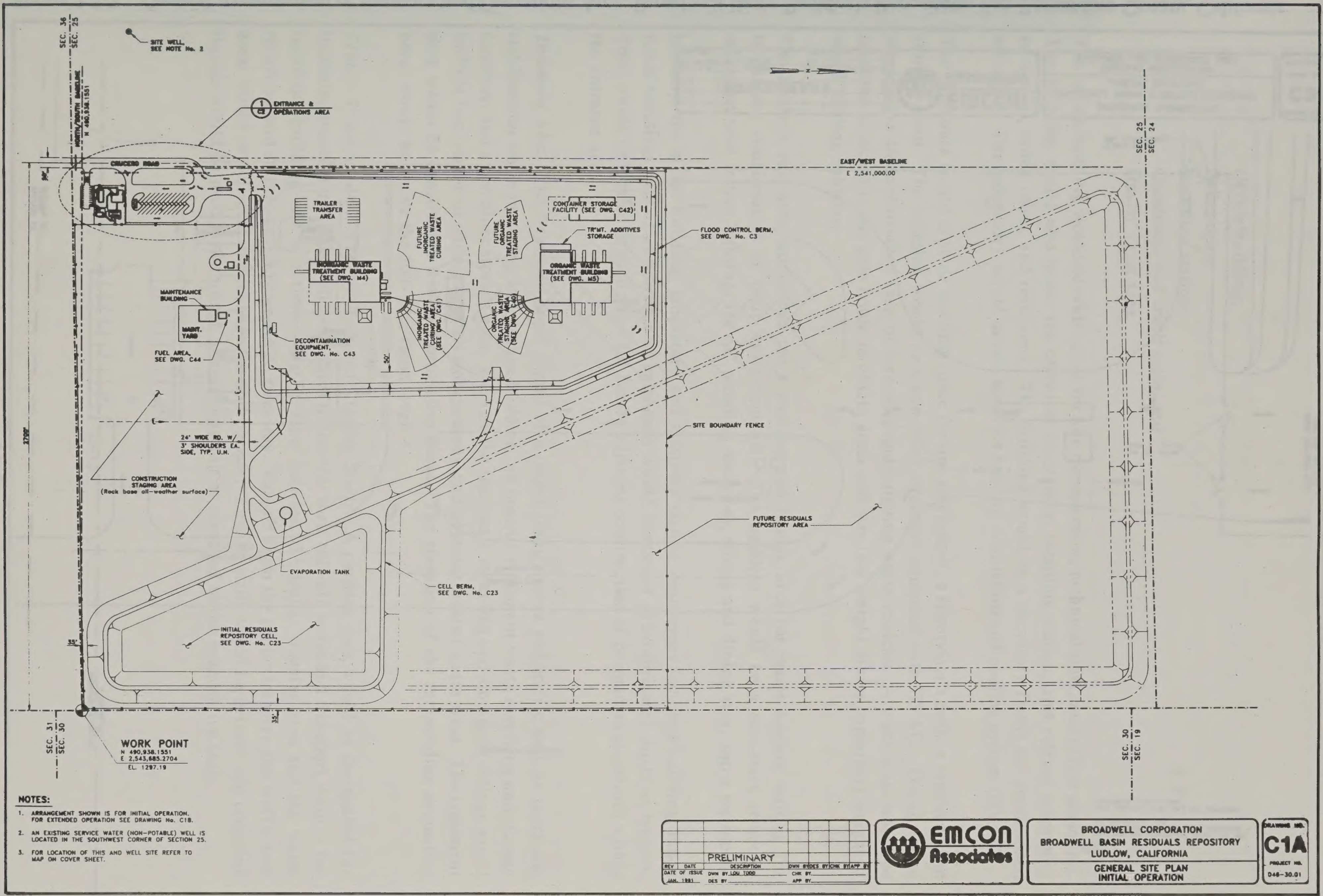

SEC. 36
SEC. 25
SITE WELL, SEE NOTE No. 2
NORTH/SOUTH BASELINE N 490,938.1551
1 C3 ENTRANCE & OPERATIONS AREA
CRUCERO ROAD
90'
TRAILER TRANSFER AREA
FUTURE INORGANIC TREATED WASTE CURING AREA
FUTURE ORGANIC TREATED WASTE STAGING AREA
CONTAINER STORAGE FACILITY (SEE DWG. C42)
TR'MT. ADDITIVES STORAGE
FLOOD CONTROL BERM, SEE DWG. No. C3
EAST/WEST BASELINE E 2,541,000.00
SEC. 25
SEC. 24
INORGANIC WASTE TREATMENT BUILDING (SEE DWG. M4)
ORGANIC WASTE TREATMENT BUILDING (SEE DWG. M5)
INORGANIC TREATED WASTE CURING AREA (SEE DWG. C41)
ORGANIC TREATED WASTE STAGING AREA (SEE DWG. C40)
MAINTENANCE BUILDING
MAINT. YARD
FUEL AREA, SEE DWG. C44
DECONTAMINATION EQUIPMENT, SEE DWG. No. C43
50'
SITE BOUNDARY FENCE
24' WIDE RD. W/ 3' SHOULDERS EA. SIDE, TYP. U.N.
2700'
CONSTRUCTION STAGING AREA (Rock base all-weather surface)
FUTURE RESIDUALS REPOSITORY AREA
EVAPORATION TANK
CELL BERM, SEE DWG. No. C23
INITIAL RESIDUALS REPOSITORY CELL, SEE DWG. No. C23
35'
35'
SEC. 31
SEC. 30
SEC. 30
SEC. 19
WORK POINT
N 490,938.1551
E 2,543,685.2704
EL. 1297.19
NOTES:
1. ARRANGEMENT SHOWN IS FOR INITIAL OPERATION. FOR EXTENDED OPERATION SEE DRAWING No. C1B.
2. AN EXISTING SERVICE WATER (NON-POTABLE) WELL IS LOCATED IN THE SOUTHWEST CORNER OF SECTION 25.
3. FOR LOCATION OF THIS AND WELL SITE REFER TO MAP ON COVER SHEET.
PRELIMINARY
REV
DATE
DESCRIPTION
DWN BY
DES BY
CHK BY
APP BY
DATE OF ISSUE
JAN. 1981
DWN BY LOU TODD
DES BY
CHK BY
APP BY
EMCON Associates
BROADWELL CORPORATION
BROADWELL BASIN RESIDUALS REPOSITORY
LUDLOW, CALIFORNIA
GENERAL SITE PLAN
INITIAL OPERATION
DRAWING NO.
C1A
PROJECT NO.
048-30.01

Figure 2.2-6 Entrance, Treatment, and Support Facilities, and Repository Cells at the Proposed Broadwell Basin Residuals Repository, San Bernardino County, California

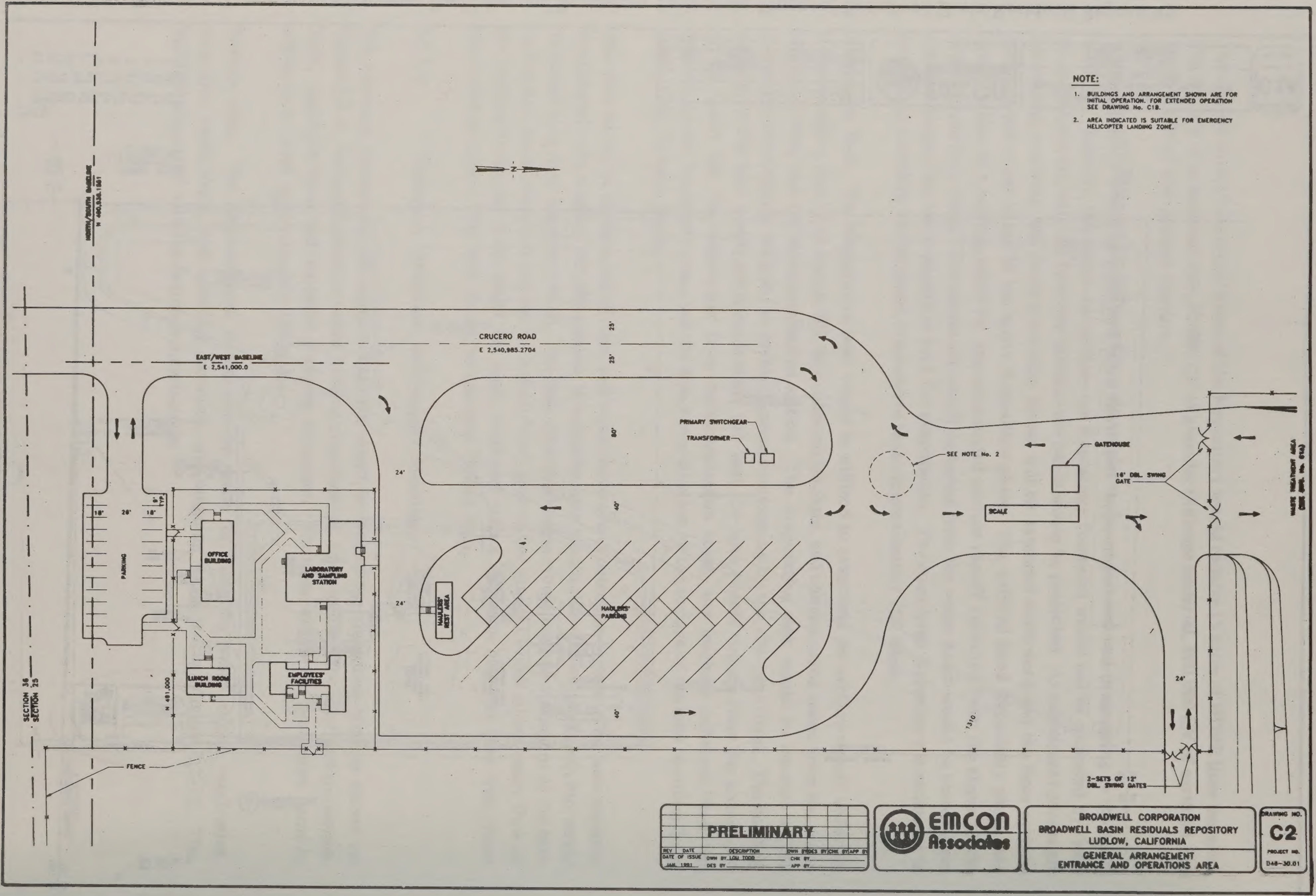


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Figure 2.2-7 General Arrangement of Entrance and Operations Area, Broadwell Basin Residuals Repository, San Bernardino County, California

- Office building;
- Laboratory;
- Sampling station;
- Gatehouse and truck scale; and
- Hauler's rest area.

The office building would provide space for site management, technical staff, and office personnel. The building would also house the chemical laboratory, sampling station, and related laboratory personnel, lunch room, and restrooms. The building would be a one-story frame air-conditioned structure. The laboratory would have a separate heating ventilation and cooling system (HVAC).

The gatehouse would provide working space for one gatekeeper, a supervisor's desk, a restroom, and storage room. The building would be a one-story structure equipped with HVAC. The structure would have an unobstructed view of incoming and outgoing waste vehicles. A truck scale would be installed adjacent to the gate house to obtain gross and tare (net weight minus container) weight of waste hauling vehicles.

The hauler's rest area would provide a parking and lounge area for waste haulers waiting for laboratory confirmation of their waste contents. The building would be a one-story structure equipped with indoor lighting, HVAC, vending machines, sitting and dining area, and a restroom.

Initially, the office building, laboratory and sampling station; employees facilities building; lunch room building; haulers rest area; and gatehouse would consist of pre-fabricated modular trailers. They would be located so as to allow for future adjacent construction of permanent structures within the entrance area.

Treatment Area. The treatment areas consist of a trailer transfer area and traffic pad, an inorganic stabilization waste receiving and storage building, an organic treatment waste receiving and storage building, and a container storage area. Each of the two waste receiving and storage buildings would include two treatment units, materials storage areas, and adjacent treated waste areas. The treatment area would be constructed within a protective berm. The elevation of the surrounding protective berm would be above the 100-year flood level.

Trailer Transfer Area, Traffic Pad, and Tipping Stalls. A parking area would be designated for incoming trucks with trailers allowing them to transfer their roll-off boxes and transport them to the receiving building one at a time. Traffic flow between the trailer transfer area and the waste receiving and storage building would be two-way. Runoff from the trailer transfer and traffic pad areas would be collected and managed as appropriate. Tipping stalls would be bermed and collected liquids would be processed through a treatment unit or removed to the evaporative tank.

Waste Receiving and Storage Building. Each of the two waste receiving and storage building would be constructed using a "Butler type" pre-engineered, rigid steel frame with raised rib steel sheet siding and roofing. The floor of the waste receiving building would be recessed below the surrounding grades. The metal building would sit on retaining walls extending above the exterior paved pad. The building's ultimate waste-holding capacity would be approximately four days in order to provide for waste surge capacity, waste preparation activities, and machinery maintenance and/or downtime. A liner and fluid collection system would be installed beneath each building.

One portion of each building would be used for receiving and temporarily storing waste. Another portion of each building would house the screening equipment used to segregate large objects (e.g., concrete chunks and other site cleanup debris) from the waste, if necessary, before the waste is belt fed into one of the treatment units. Hoppers and feeding conveyors would occupy the central section of the building. Each of the buildings would also house a drum staging area. Each building's control room for its treatment units, which could be accessed from the main building floor, would be at the extreme end of the buildings. Each control room area would contain a restroom and personnel decontamination facilities.

Vehicle access in and out of the building would be via ramps. Waste haulers would not enter the buildings, but would "tip" their waste into the buildings through a doorway.

The buildings would each be equipped with a ventilation system that would discharge through a baghouse or other filter to control the dust and any organics, and provide a safe working environment for employees. Interior lighting would be provided by translucent panels in the roof of the building and by lamps. Exterior lighting would be provided above all doorways and outdoor equipment and storage areas.

Container Storage Area. There would be a detached container storage area for storing both drums and roll-off boxes of waste. It would be a diked concrete pad, with no walls and no roof. No waste handling would occur in this storage area, other than collecting samples of the waste and then reclosing the container. Collected precipitation would be removed to either a treatment unit or to the evaporative tank.

Support Facilities. The support facilities include the employee's building, lunch room, maintenance building, decontamination station, and fueling station. The landfill maintenance building would provide space for minor maintenance of landfill equipment and vehicles and storage of parts and utility equipment. The building would be a one-story steel frame structure with steel sidings and roofing. The building would be equipped with HVAC, indoor lighting, mechanical hoisting equipment, and a parts and equipment storage room. The employees' building would contain a personnel decontamination area and restroom with showers and lockers. The lunch room would also serve as a meeting room. The employees' building and lunch room would consist of pre-fabricated modular trailers. They would be located so as to allow for future adjacent construction of permanent structures within the support facilities area.

A decontamination station would be provided for landfill equipment and waste-hauling trucks. The station would be equipped with mechanized washing nozzles to wash down equipment body and tires. A gravity separator tank and slump pump would be located at the station. Wastewater from the gravity separator tank would be discharged to the evaporative tank. Wastewater in the tank would be allowed to evaporate or would be collected and sent to offsite treatment, if required.

The fueling area would contain diesel and gasoline tanks and pumps. The fuel tanks would be aboveground and surrounded by containment dikes.

Electrical Power. Southern California Edison has indicated that the likely electrical power source for the site would be a 33-kilovolt distribution line in Ludlow. Electrical power would be provided by extending an existing overhead line on 39-foot-high wood poles along the east side of Crucero Road from Ludlow out to the site. The power poles would be raven-proof to deter potential predation of any tortoises. Annual electric power consumption by the project is estimated at 1.7 million kilowatt hours (kWh). An emergency diesel generator with a 250-kW capacity would be located at the project site.

Telephone Service. Pacific Bell has indicated that it would provide telephone service and connection at the point of its existing line in Ludlow. Broadwell Corporation would string phone lines from Ludlow out to the site on the Southern California Edison wood power poles to be located along Crucero Road.

Sewage Disposal. Sewage generated in the facilities areas would be discharged to individual septic tanks that would drain to a leach field. Septic tanks would be located adjacent to each applicable building and would be sized to handle daily sewage flow. Effluent from the septic tanks would be transported by gravity pipeline to the leach field area for final treatment and disposal. Drain lines and location for the leach field would be designed based on San Bernardino County Department of Environmental Health Services standards.

Ancillary Facilities. Ancillary facilities such as gates, chainlink fences, and signage would be installed to secure the entire facility. Gates would be located to limit the number of controlled access points to the treatment facility and waste repository cell.

2.2.2.4 Borrow Areas

Coarse and Aggregate Borrow Area. Construction and operation of the Repository would require substantial volumes of coarse and aggregate borrow materials, with suitable physical characteristics such as hydraulic conductivity, durability, and strength. An area to the northwest of the project site contains enough coarse and aggregate material to meet project requirements. Covering 363 acres, the area is on federal lands in three sections (Sections 14, 23, and 24), as shown on Figure 2.2-2. During the construction of the Repository, approximately 3.1 million tons or 2.1 million CY of material would be mined (Figure 2.2-8). After the initial construction period, approximately 370,000 tons (250,000 CY) per year of coarse borrow material would be required to support disposal operations. Total volume of materials to be mined from this site over the 20- to 50-year life of the project is estimated at 10.4 million tons (7.0 million CY).

The mined material would be transported to the project site by trucks using the existing trail in Section 24 to Crucero Road and then south on Crucero Road to the project site. The access route would be widened to 30 feet but would not be paved. The widening of the road will disturb approximately seven acres. A chemical stabilizer would be used to form a hard surface on the road and to minimize fugitive dust. During the peak construction period, a total of 250 trips per day would be made by trucks between the borrow area and the project site. During normal operations, this number would be reduced to four truck/scraper trips per day, with occasional periods of more intensive material production and transport.

Clay Material Borrow Area. The clay borrow area is in the western portion of Section 30, Township 9 North, Range 8 East (Figure 2.2-2). Over the 20- to 50-year life of the project, clay material would be mined from 227 acres of land. About 740,000 tons (600,000 CY) of clay would be mined during the first year. After the first year, the annual average volume of clay extracted to support disposal operations is estimated at 245,000 tons (200,000 CY). The total volume of material expected to be mined from the Broadwell clay borrow area is 5.5 million tons or 4.5 million CY.

The dimensions of the clay borrow site are depicted on Figure 2.2-9. The maximum depth of the clay borrow area would be 30 feet. The maximum depth of water on the lake bed under the PMP event is estimated to be 23 feet. With the additional 30 feet of depth in the clay borrow site, the maximum depth of water under the most severe rainfall conditions would be 53 feet. The water table within the lake bed lies about 80 feet below the ground surface. With a 30-foot deep pit, the water table would still be about 50 feet below the pit bottom, sufficient to maintain the integrity of the lake bed.

Access to the clay borrow area would be from roads extending from Section 25 (Repository site) directly into adjacent Section 30. The access route(s) would not require the construction of any specific roads on the lake bed, but equipment travel routes would be designated within the 227-acre borrow site to transfer the clay to the Repository site. During the peak construction period, a total of 150 trips per day would be made by trucks and scrapers; during operations, the number of truck or scraper trips would be reduced to only two per day with occasional periods of more intensive material production and transport.

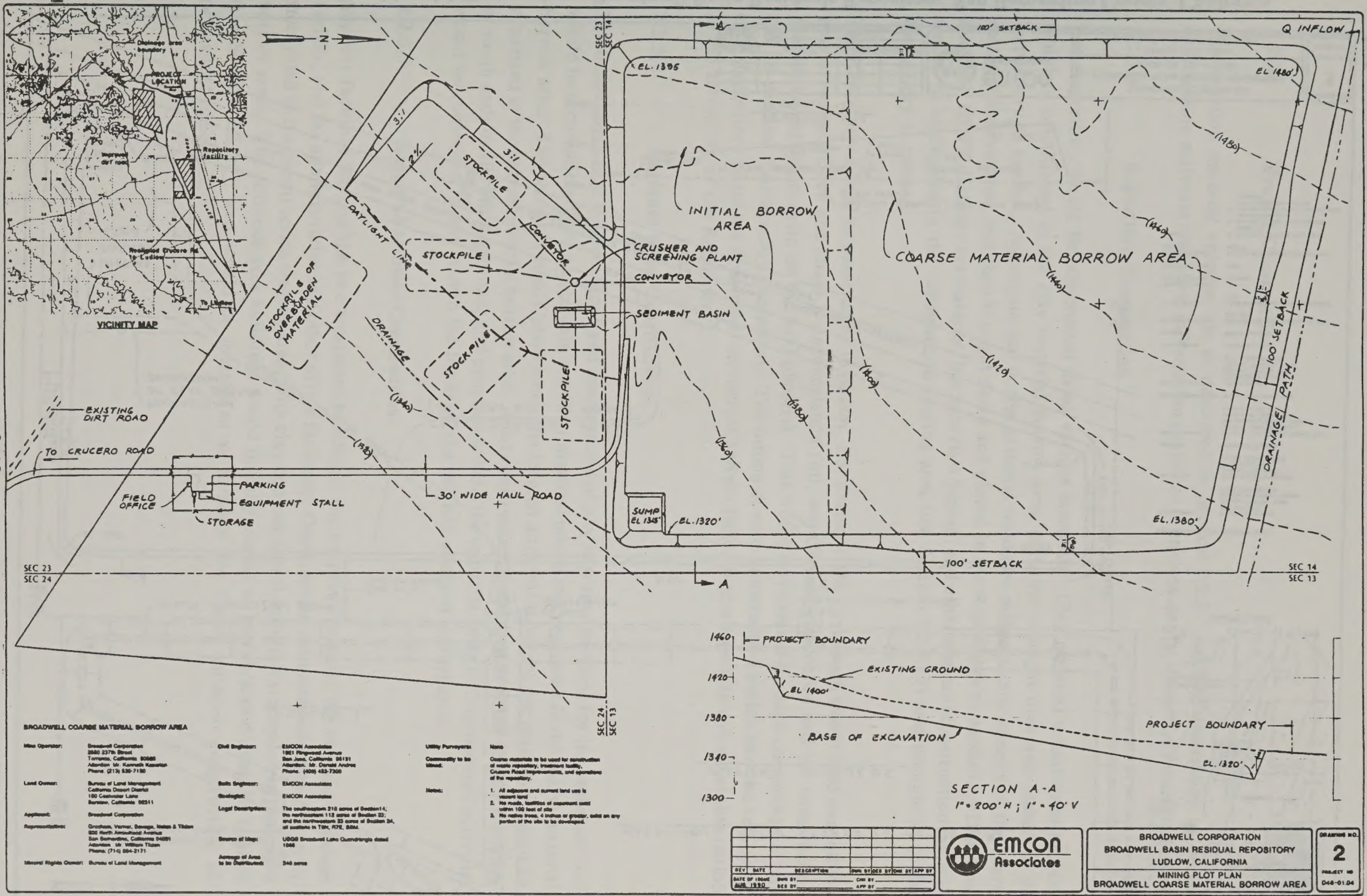


Figure 2.2-8 Mining Plot Plan, Coarse Material Borrow Area, Broadwell Basin Residuals Repository, San Bernardino County, California

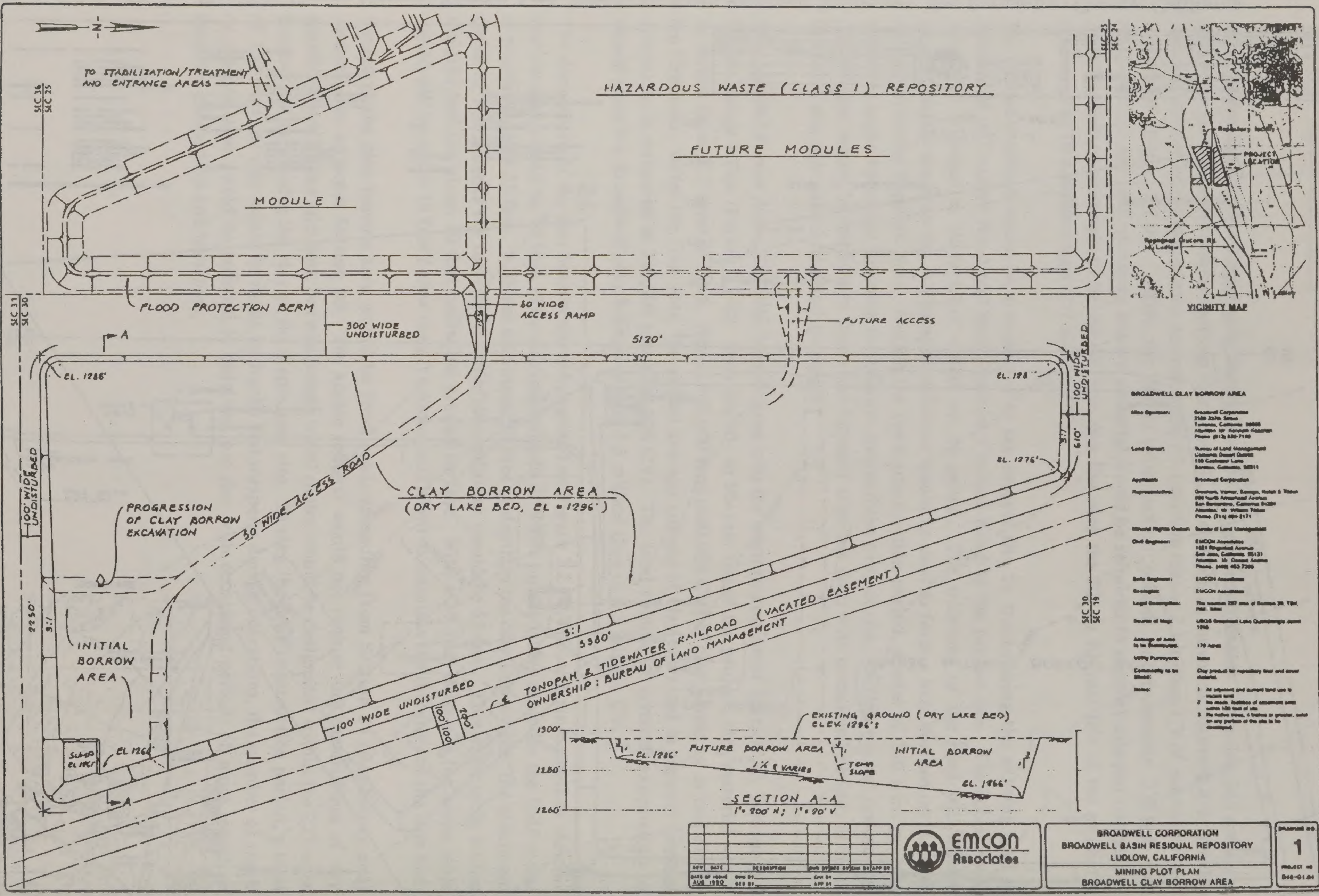


Figure 2.2-9 Mining Plot Plan, Clay Material Borrow Area, Broadwell Basin Residuals Repository, San Bernardino County, California

2.2.3 Project Construction

Construction material volumes are as described in Section 2.2.2. A brief description of certain construction activities and other information pertinent to environmental impacts are provided below.

2.2.3.1 Repository Construction

The Repository would be constructed using various materials. Clay material would be mined and moisture conditioned in the clay material borrow area, and then brought over and placed in the Repository as needed. Aggregate and coarse material would be mined and processed in the coarse material borrow area, and then brought down and placed in the Repository as needed. HDPE liner material, HDPE drainage net material, leachate riser piping, and other non-soil construction material would be stockpiled in the construction staging area (see Section 2.2.4.11) and brought in to the Repository as needed.

The Repository would be constructed in phases. For example, the first phase would hold one million tons of waste. Once one phase is appropriately full, work would commence and the construction process would begin again on the next phase(s). This would be repeated through completion of the full 16-million-ton-capacity Repository. The timing of each construction period and the volume of each Repository phase are dependent on current and projected incoming waste volume at that period in the active life of the Repository.

2.2.3.2 Entrance Road Construction

The improvements to Crucero Road and construction of any new road sections for the entrance road would be accomplished using aggregate and other material mined and processed in the coarse material borrow area. The asphalt hot mix plant would be located adjacent to where the materials would be processed in the coarse material borrow area. Road construction could start at either or both the north or south ends of the entrance road, and progress toward the opposite end(s). Construction activities would be controlled to stay within the limits of the defined width of disturbance.

2.2.3.3 Support Facilities Construction

Support facilities include the two treatment buildings, the evaporative tank, the container storage facility, and the administrative and other office facilities. Construction materials would be primarily stockpiled in the construction staging area, with clay and coarse soil materials stockpiled in those two borrow areas. The entrance area buildings would initially consist of prefabricated modular trailers (see Section 2.2.2.3), and would be located so as to allow for future adjacent construction of permanent structures.

2.2.3.4 Construction Water Demand

During construction, water usage would vary up to roughly 400,000 gallons per day (GPD). This compares to water usage of approximately 70,000 GPD during routine operations. The initial construction period is estimated to last up to one year. Construction water would be used for dust control, moisture conditioning of clay liner construction material, preparation of concrete, and for myriad other general construction purposes.

2.2.3.5 Construction Manpower

At the peak of construction, approximately 100 construction workers and supervisory personnel would be involved for a period of up to one year.

2.2.4 Project Operations

The Repository would accept, treat, and dispose of solid hazardous wastes and other solid wastes that meet state and federal treatment standards. The Repository would accept only solid waste that meets the applicable treatment standards, or that can be treated to meet the treatment standard. Table 2.2-2 lists examples of the federal waste streams and Table 2.2-3 identifies examples of the California waste streams that are treatable by the proposed inorganic stabilization technology at the onsite treatment facility. Different waste streams would be treated by the proposed organic treatment technology at the onsite treatment facility.

The waste that would be accepted for treatment at the proposed facility includes metal contaminated solid waste residues (e.g., sludges and filter press cakes) and contaminated soils. The proposed treatment is a stabilization process which minimizes the leaching potential of the metals and organic treatment processes which remove the deleterious organic materials in the waste stream.

As defined by analysis of the pre-acceptance Profile Sample, no commercial liquid wastes would be accepted for treatment or disposal at the facility. There would, however, be liquid wastes generated on the site through the management of incoming wastes; for example, leachate and vehicle wash wastewater. These wastes would generally be managed on the site in the evaporation tank, or would be transported off the site for other types of treatment or disposal.

2.2.4.1 Entrance Area

All incoming waste would be transported to the Broadwell Basin Residuals Repository by registered haulers in a vehicle certified to be in compliance with state and federal hazardous waste transport requirements. The quantity of incoming waste is estimated to be 2,000 tons per day. The majority of the waste would arrive at the site in bulk (10- to 25-ton truck and trailer assemblies with roll-off boxes); however, some generators may ship waste in small containers, such as 55-gallon drums.

Table 2.2-2

Broadwell Basin Residuals Repository
Primary Waste Acceptance List for Inorganics Treatment
(Federal Waste Streams)[1]

Waste Code	Description
D004	Arsenic
D005	Barium
D006	Cadmium
D007	Chromium
D008	Lead
D009	Mercury
D010	Selenium
D011	Silver
F006	Wastewater treatment sludges from electroplating operations.
F008	Plating bath sludges from the bottom of plating baths from the electroplating operations where cyanides are used.
F010	Quenching bath sludge from oil baths from metal heat treating operations where cyanides are used in process.
F012	Quenching wastewater treatment sludges from metal heat treating operations where cyanides are used.
F019	Wastewater treatment sludges from the chemical conversion of aluminum.
K004	Wastewater treatment sludge from the production of zinc yellow pigments.
K008	Oven residues from the production of chrome oxide green pigments.
K046 (Nonreactive)	Wastewater treatment sludges - lead-based initiating compounds.
K061	Emission control dust - steel that contains less than 15 percent zinc.
K069	Emission control dust - lead.
K071	Brine muds - mercury cell chlorine production.
K101	Tar residues - analine/arsenic compounds, veterinary.
K102	Activated carbon - arsenic veterinary pharmaceuticals.
K106	Wastewater treatment sludge - mercury cell/chlorine.

Note: [1] Federal waste streams, by waste code, that can be treated by the proposed technology.

Source: EMCON Associates 1990.

Table 2.2-3

Broadwell Basin Residuals Repository
Primary Waste Acceptance List for Inorganics Treatment
(California Waste Streams)[1]

Waste Code	Description
171	Metal sludge.
172	Metal dust and machining waste.
181	Other inorganic solid waste.
411	Alum and gypsum sludge.
421	Lime sludge.
431	Phosphate sludge.
441	Sulfur sludge.
451	Degreasing sludge.
461	Paint sludge.
471	Paper sludge/pulp.
481	Tetraethyl lead sludge.
491	Unspecified sludge waste.
571	Fly ash, bottom ash, and retort ash.
591	Baghouse waste.
611	Contaminated soil from site cleanups.
613	Auto shredder waste.

Note: [1] California waste streams, by waste code, that can be treated by the proposed technology. This list could be modified as the state adopts treatment standards for non-Resource Conservation and Recovery Act waste streams.

Source: EMCON Associates 1990.

Vehicles transporting waste to the Repository would access the site from Crucero Road and proceed to the entrance area. Each hauler would approach the sampling station, where a representative from the onsite laboratory would sample the delivered waste and perform chemical confirmation testing, if necessary. When clearance is received, the hauler would approach the gatehouse and scale to weigh in and deliver waste manifests and laboratory clearance for their loads. The gatehouse attendant would instruct the hauler to proceed either to the treatment area or the Repository.

2.2.4.2 Treatment Area

Vehicles carrying waste requiring treatment would access the waste treatment area and then proceed to the trailer transfer area. Vehicles would back into the tipping stalls and deposit their load through an open doorway into either the organics or inorganics waste receiving, storage, and treatment buildings.

The quantity of the incoming waste requiring treatment is estimated to be 1,000 tons per day. The purpose of treatment is to reduce contaminants to below protective levels. The waste deposited for treatment in either the inorganic stabilization or organic treatment building would be transported to the feed hoppers in the building with rubber-tired loaders. If the waste contains oversize objects (e.g., concrete chunks and other site cleanup debris), it would be screened before it is conveyed to the feed hoppers. The oversize waste would be diverted to a crusher located inside each building, where it may receive additional handling before being treated or placed in the Repository. Waste delivered in small containers would be maintained in each building's drum staging area until the contents of the containers are ready to be conveyed to the feed hoppers.

Waste entering either the inorganic stabilization or organic treatment feed hoppers would be conveyed to the applicable treatment units, where it would be processed. The processed material would be conveyed to an adjacent diked pad for curing and/or testing as necessary. The processed inorganic material would cure for one to two days. The processed organic material would not require curing. Once the material cures, it would be sampled and tested, as necessary, to determine if it meets the treatment standards. If the treated waste meets the standard, it would be transported to the Repository cell. If the treated waste does not meet the standards, it would be transported back to the treatment unit for further processing.

2.2.4.3 Treatment Units

Two inorganic stabilization treatment units would be located in the inorganic stabilization waste receiving and storage building. Each of these two inorganic stabilization treatment units would have a mixing tank for blending the treatment solutions.

Waste would be fed to and from the inorganic stabilization treatment units by conveyors. The treatment solutions would be pumped from the mixing tank to the treatments units; other additives would be fed to the system using pneumatic conveyance. The treatment units can each process up to approximately 200 tons of waste per hour. The inorganic stabilization treatment process increases the waste volume by approximately 10 to 15 percent.

Two organic waste treatment units would be located in the organic treatment waste receiving and storage building. At least one of these units would utilize a "soil washing" technique, in which a treatment fluid is applied to the waste in a mixing system. After proper agitation and residence time, the treated waste is separated from the now-contaminated treatment fluid, which is subsequently reclaimed in a recovery system. In addition, other organic solid treatment processes involving treatment solutions, water, and dry additives would be used at the site in the future.

If their wheels and undercarriages contact contaminants, the vehicles transporting the treated waste to the Repository would travel only on roadways separate from other (uncontaminated) site traffic. They would be decontaminated before being allowed to travel on general site roadways. If their wheels and undercarriages remain clean, the vehicles transporting the treated waste to the Repository may also travel on general site roadways.

2.2.4.4 Materials Storage Area

The materials required for the treatment processes include treatment solutions, water, and dry additives. These materials and treatment reagents are not hazardous. The vehicles delivering these materials (except water) to the site would access the storage area of each building from the southeast end of the treatment area. Water would be piped to the treatment facilities from the onsite well-supplied system.

2.2.4.5 Treated Waste

The waste exiting the treatment units would be transported to an adjacent diked pad for curing and/or testing as necessary. Wind and rain protection for the waste on these open pads would be provided as necessary by covering the treated waste with visqueen, foam, plasticizer, or other material. The treated inorganic stabilization waste would be spread in a one- to two-foot layer and allowed to cure for one to two days where it would be worked with heavy equipment (similar to concrete curing) to prevent the formation of solid mass. Cover material would be replaced as necessary after working. The treated organic waste would be placed into piles. Once the treated inorganic stabilization waste cures or the treated organic waste is placed into a pile, the waste would be sampled and analyzed as necessary to determine if the waste meets the treatment standard. These treatment standards are the very stringent state and federal "land disposal restrictions" [40 CFR Part 268, and 22 CCR Articles 40 and 41]. Wastes that do not meet the treatment standard would be returned to the beginning of the treatment area for reprocessing.

After the laboratory confirms that the waste meets the treatment standard, as necessary, the treated wastes would be placed into the Repository and then compacted by a dozer-drawn sheep's foot compactor or a segmented wheel soil compactor. Successive layers of waste would be placed until the appropriate lift thickness is achieved.

2.2.4.6 Other Waste

Bulk-contaminated wastes that already meet the treatment standard would be hauled to the landfill by the same truck that transported the material to the site. The waste would be placed in the active landfill cell and compacted. These bulk wastes may be incorporated into the treated waste lifts or they may be placed in a separate lift. Wastes would be covered with soil from the project-dedicated coarse borrow area, foam, or with a geotextile or other cover material as necessary to prevent windblown dispersion.

2.2.4.7 Fill Progression and Final Cover Placement

Landfilling of wastes would commence at the southeast end of the Repository and would advance north/northwest. Ongoing operations would include the construction of individual disposal cells (within the initial one-million-ton-capacity phase of the repository) which would be filled and periodically covered with clean soil until a cell is completed. In addition, daily dust control would be provided by covering the waste as necessary with water, soil, foam, plasticizer, or other material. As areas are filled to within four feet of the final grades, final cover soils would be placed over the wastes to preclude penetration of precipitation into the waste or waste exposure by erosion.

2.2.4.8 Dust Control

Dust control on unpaved roads used by the facility would be accomplished through the use of aggregate, chemical stabilization, watering, and other measures, as necessary, to comply with air quality laws and regulations. Water would be used sparingly to control dust when compacting wastes in the landfill.

2.2.4.9 Evaporative Tank

Wastewater generated from the waste treatment area and decontamination facilities would be collected and discharged to the evaporative tank. All oily wastewater from the decontamination areas would drain through a gravity separator before being discharged to the evaporative tank for evaporation.

Construction water from consolidation of clay material in the secondary liner system sumps and contaminated water in the primary liner system sumps would be pumped out periodically and discharged to the evaporative tank for evaporation. As determined necessary based on constituent analyses, state and federal treatment standards may require leachate to be transported off the site for disposal.

Stormwater runoff from landfilled wastes would be confined in the active cell by the underlying liner system. The liner system would also cap the soil berms surrounding the cell. Stormwater collected in the lined cell, plus any other contaminated stormwater, would be removed to the evaporative tank for evaporation.

2.2.4.10 Operations Area

The operations area would be dedicated to daily operations, decontamination, and fueling and maintenance of landfill equipment such as scrapers, dozers, compactors, a motor grader, and utility vehicles. Scheduled maintenance of equipment and vehicles would be performed in the equipment maintenance building. When necessary, vehicles and equipment would be decontaminated in the onsite decontamination facilities.

2.2.4.11 Construction Staging Area

The construction staging area would serve as a storage area for equipment, supplies, and materials used during construction of the Repository cells and other support facilities.

2.2.4.12 Decontamination Station

A decontamination station would be provided for landfill equipment and waste-hauling vehicles. Landfill equipment requiring decontamination before maintenance off the site would utilize the decontamination station.

Waste-hauling vehicles traveling from the Repository cells would access the vehicle decontamination station from the entrance area located at the southeast end of the treatment area.

Wastewater generated from the decontamination station would be collected and discharged to the evaporative tank.

2.2.4.13 Emergency Power

A diesel-powered generator would provide emergency power during outages at the site. The loads to be served with emergency power would include the raw water supply pumping system, the treatment facility, security systems, and the office/laboratory complex. During a power outage, these loads would be served from an emergency service located in the power distribution center. The diesel generator would be operated monthly for one hour to maintain the operational integrity of the emergency power system.

2.2.4.14 Water Supply

The daily water demand for site operations is estimated at 70,000 GPD (17.5 million gallons per year) including 40,000 gallons for the waste treatment facility; 2,500 for domestic use; 7,500 for decontamination station; and 20,000 for dust control. An existing water well located in the southwestern portion of Section 25 is capable of supplying the water required, but additional production wells may be drilled to provide backup water supply. Water for fire control and subsequent construction would be stored in the raw water tank with a 20,000-gallon capacity. Initial tests indicate the quality of groundwater does not meet drinking water standards; therefore, bottled water would be provided for drinking.

2.2.4.15 Manpower Requirements

During the operations period, permanent personnel requirements are estimated at 35 to 45 people. However, as many as 45 to 55 persons, including permanent employees, regulatory personnel, and visitors, may be at the site on any given day.

2.2.4.16 Site Closure and Long-Term Security of the Site

Site closure is a formal process that would be determined in the Part "B" application and permit that would be issued after the land use permits have been obtained from the County and BLM. Site closure is dictated by federal and state regulations. Broadwell Corporation would follow these regulations and establish specific procedures for accomplishing site closure in the Part "B" permit application. The discussion that follows presents a generalized procedure for maintenance of the systems (Repository cover and leachate collection systems) and protection of the site from trespass and entry.

The final closure of the site would be accomplished in a manner so as not to require continued staffing on the site. Subchapter 15 requirements would be satisfied by capping the waste with two feet of residue-free soil overlain by two feet of soil with a permeability less than 1×10^{-7} cm/sec. Built-in provisions to facilitate monitoring of the Repository would be included. By the time complete closure is accomplished in 20 to 50 years, some onsite experience would have been gained regarding the effectiveness of the already closed modules and cells. Additionally, hazard potential of the deposited waste would have been established based on actual receipts, not projections. With these data, additional closure steps, if required, can be designed and accomplished.

Closure and post-closure activities include, among other things:

- An independent engineer's certification that the closure cap was constructed in accordance with the regulations;

- Approval of the closure work and subsequent issuance of a post-closure permit by DHS;

- Inclusion of certain statements on hazardous waste disposal into the property deed, to preclude any potential of future land use conflicts; and

- Routine groundwater monitoring, leachate collection, and closure cap inspection - these latter activities would occur for at least 30 years after the last waste shipment has been received at the Repository, and would continue for a further period if shown to be necessary by the state DHS.

Site security would be accomplished by continued maintenance of fencing and posting of signs. Need for a 24-hour patrol is not anticipated. Admittance to the site by vehicles would be solely by gates which would be locked when not in use. Monitoring of the site for any damage would be conducted at regular intervals identified in the monitoring plan and after each occurrence of natural hazard events, such as flooding and earthquakes.

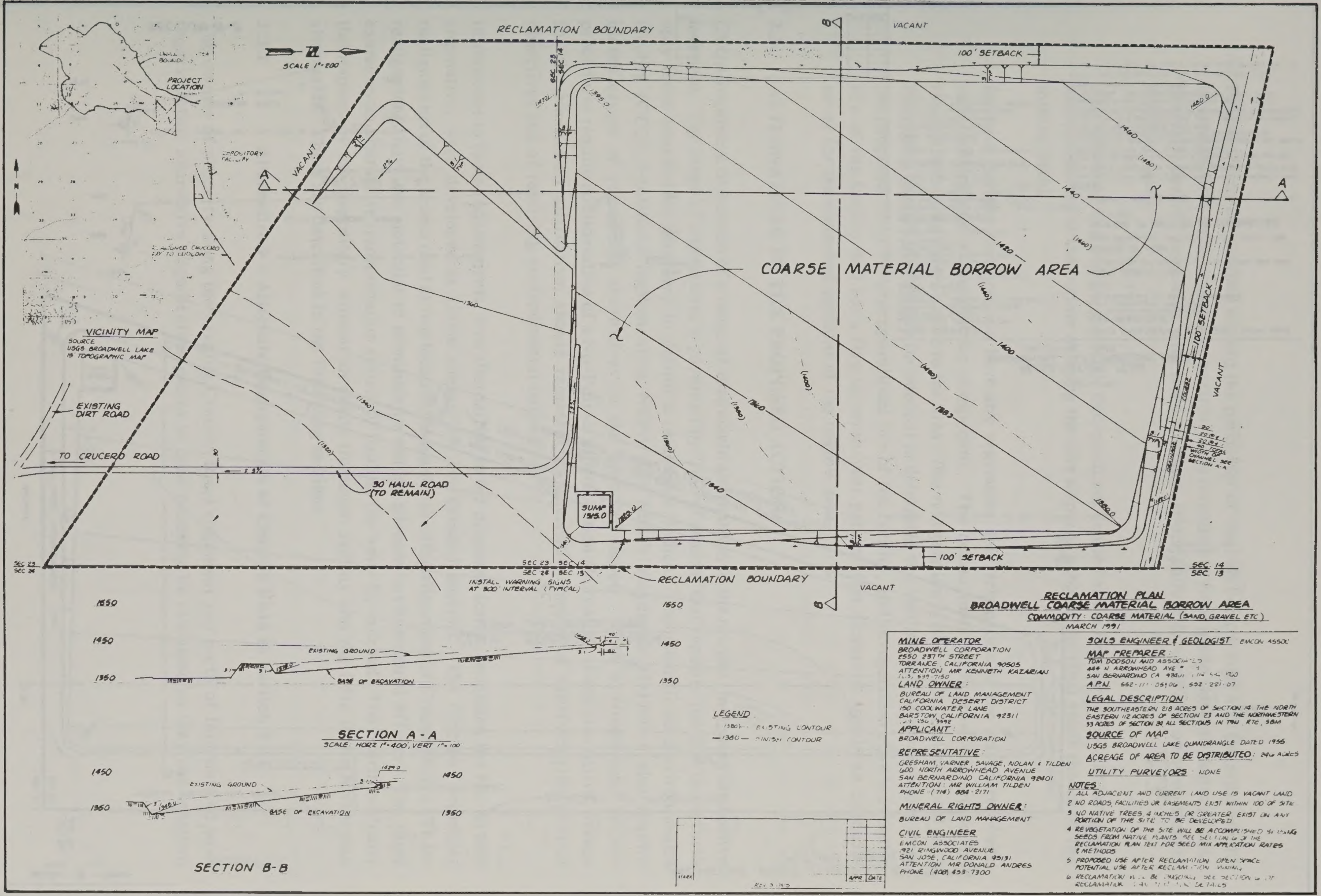
2.2.4.17 Reclamation of Clay and Coarse Material Borrow Sites

Reclamation of clay and coarse material borrow sites would be administered by the County of San Bernardino, in accordance with SMARA, and by BLM, in accordance with 43 CFR 3610. SMARA defines reclamation as the combination of land treatments that minimize water degradation, air pollution, damage to aquatic or wildlife habitat, and erosion. 43 CFR 3610 defines reclamation as taking reasonable measures to prevent unnecessary or undue degradation of federal lands, including reshaping land and, where necessary, revegetating.

When mining of both borrow sites is completed, the sites would be reclaimed as shown on Figures 2.2-10 and 2.2-11 by undertaking the general reclamation measures outlined in the Reclamation Plan submitted to the County and summarized below for the clay and coarse material borrow sites:

- At both borrow sites all equipment and temporary facilities would be removed. No man-made objects would remain at either site when the removal operation is completed.

- At both locations the slopes would be graded to the final slope contours shown on the reclamation plan. At both locations drainage facilities would be installed. At the coarse material borrow site, flows would be allowed to percolate into the alluvium. If necessary, drainage facilities would be daylighted at the southeastern edge of the borrow site to allow flows to continue downslope to Broadwell Dry Lake in existing drainage courses and at rates no higher than would occur under natural conditions. On the dry lake bed, drainage flows into the clay borrow site would be controlled to prevent erosion of the borrow area side walls.



RECLAMATION PLAN
BROADWELL COARSE MATERIAL BORROW AREA
COMMODITY: COARSE MATERIAL (SAND, GRAVEL ETC)
MARCH 1991

MINE OPERATOR
BROADWELL CORPORATION
2550 237TH STREET
TORRANCE, CALIFORNIA 90505
ATTENTION MR KENNETH KAZARIAN
(213) 539-7150

LAND OWNER:
BUREAU OF LAND MANAGEMENT
CALIFORNIA DESERT DISTRICT
150 COOLWATER LANE
BARSTOW, CALIFORNIA 92311
(619) 256-3598

APPLICANT:
BROADWELL CORPORATION

REPRESENTATIVE:
GRESHAM, VARNER, SAVAGE, NOLAN & TILDEN
600 NORTH ARROWHEAD AVENUE
SAN BERNARDINO CALIFORNIA 92401
ATTENTION: MR WILLIAM TILDEN
PHONE (714) 884-2171

MINERAL RIGHTS OWNER:
BUREAU OF LAND MANAGEMENT

CIVIL ENGINEER
EMCON ASSOCIATES
1921 RINGWOOD AVENUE
SAN JOSE, CALIFORNIA 95131
ATTENTION MR DONALD ANDRES
PHONE (408) 453-7300

SOILS ENGINEER & GEOLOGIST EMCON ASSOC

MAP PREPARER:
TOM DODSON AND ASSOCIATES
444 N ARROWHEAD AVE # [illegible]
SAN BERNARDINO CA 92401 (714) [illegible]

A.P.N. 552-111-05,06, 552-221-07

LEGAL DESCRIPTION
THE SOUTHEASTERN 218 ACRES OF SECTION 14, THE NORTH EASTERN 112 ACRES OF SECTION 23 AND THE NORTHWESTERN 33 ACRES OF SECTION 24, ALL SECTIONS IN T9N, R7E, SBM

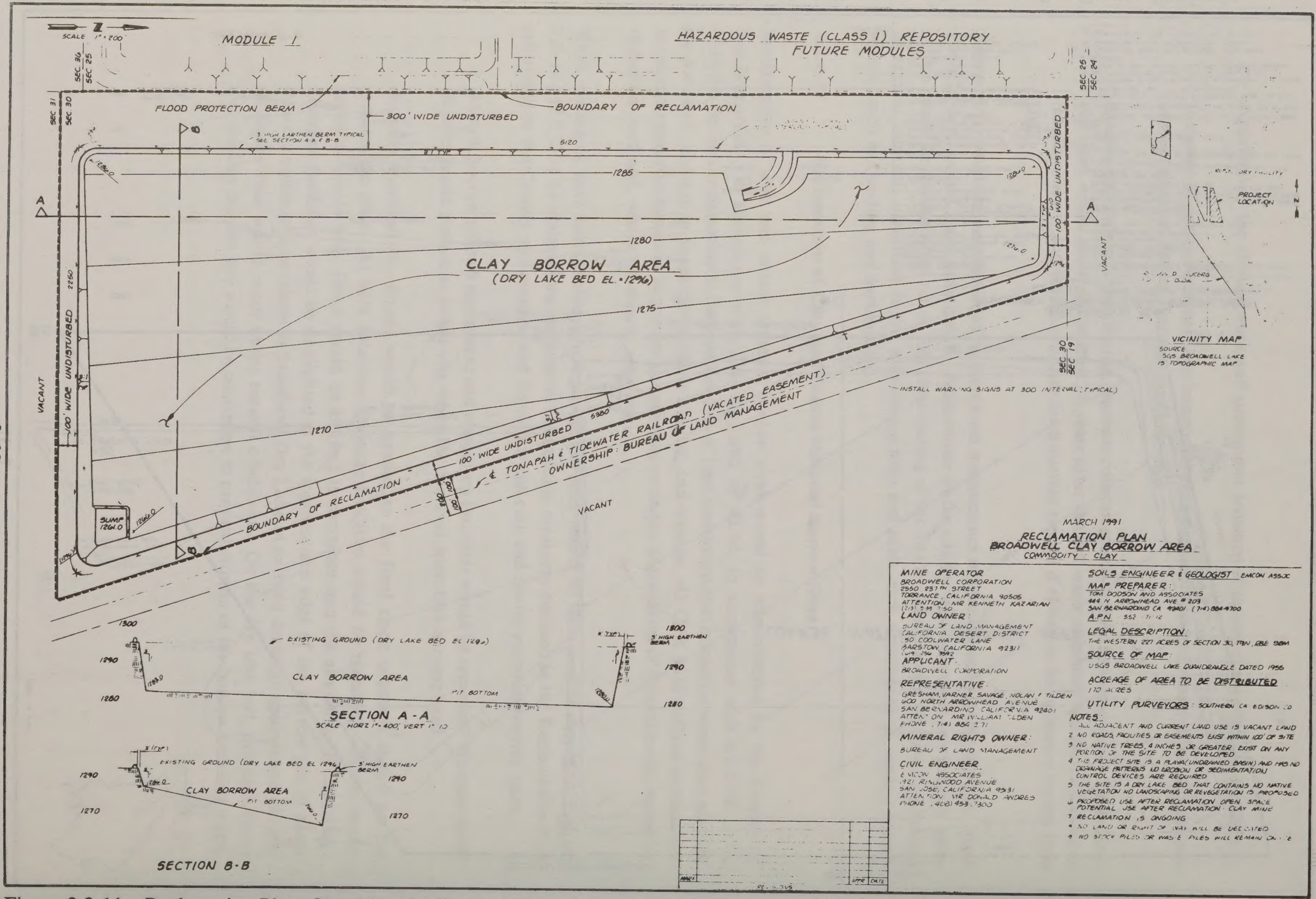
SOURCE OF MAP
USGS BROADWELL LAKE QUANDRANGLE DATED 1956

ACREAGE OF AREA TO BE DISTRIBUTED: 246 ACRES

UTILITY PURVEYORS NONE

NOTES:
1 ALL ADJACENT AND CURRENT LAND USE IS VACANT LAND
2 NO ROADS, FACILITIES OR EASEMENTS EXIST WITHIN 100' OF SITE
3 NO NATIVE TREES 4 INCHES OR GREATER EXIST ON ANY PORTION OF THE SITE TO BE DEVELOPED
4 REVEGETATION OF THE SITE WILL BE ACCOMPLISHED BY USING SEEDS FROM NATIVE PLANTS. SEE SECTION 6 OF THE RECLAMATION PLAN TEXT FOR SEED MIX APPLICATION RATES & METHODS
5 PROPOSED USE AFTER RECLAMATION OPEN SPACE. POTENTIAL USE AFTER RECLAMATION MINING
6 RECLAMATION WILL BE ONGOING. SEE SECTION 6 OF RECLAMATION PLAN TEXT FOR DETAILS

Figure 2.2-10 Reclamation Plan, Coarse Material Borrow Area, Broadwell Basin Residuals Repository, San Bernardino County, California



MARCH 1991

RECLAMATION PLAN
BROADWELL CLAY BORROW AREA
COMMODITY : CLAY

MINE OPERATOR
BROADWELL CORPORATION
2550 237TH STREET
TORRANCE, CALIFORNIA 90505
ATTENTION MR KENNETH KAZARIAN
(213) 539 7150

LAND OWNER:
BUREAU OF LAND MANAGEMENT
CALIFORNIA DESERT DISTRICT
150 COOLWATER LANE
BARSTOW, CALIFORNIA 92311
(619) 256 3592

APPLICANT:
BROADWELL CORPORATION

REPRESENTATIVE:
GRESHAM, VARNER, SAVAGE, NOLAN & TILDEN
600 NORTH ARROWHEAD AVENUE
SAN BERNARDINO CALIFORNIA 92401
ATTENTION MR WILLIAM TILDEN
PHONE (714) 884 2171

MINERAL RIGHTS OWNER:
BUREAU OF LAND MANAGEMENT

CIVIL ENGINEER
EMCON ASSOCIATES
1921 RINGWOOD AVENUE
SAN JOSE, CALIFORNIA 95131
ATTENTION MR DONALD ANDRES
PHONE (408) 453 7300

SOILS ENGINEER & GEOLOGIST: EMCON ASSOC

MAP PREPARER:
TOM DODSON AND ASSOCIATES
444 N ARROWHEAD AVE # 203
SAN BERNARDINO CA 92401 (714) 884-4700

A.P.N. 552 71 12

LEGAL DESCRIPTION:
THE WESTERN 227 ACRES OF SECTION 30, T9N, R8E SBM

SOURCE OF MAP:
USGS BROADWELL LAKE QUANDRANGLE DATED 1956

ACREAGE OF AREA TO BE DISTRIBUTED
170 ACRES

UTILITY PURVEYORS: SOUTHERN CA EDISON CO

NOTES:
1. ALL ADJACENT AND CURRENT LAND USE IS VACANT LAND
2. NO ROADS, FACILITIES OR EASEMENTS EXIST WITHIN 100' OF SITE
3. NO NATIVE TREES, 4 INCHES OR GREATER EXIST ON ANY PORTION OF THE SITE TO BE DEVELOPED
4. THE PROJECT SITE IS A PLAYA (UNDRAINED BASIN) AND HAS NO DRAINAGE PATTERNS NO EROSION OR SEDIMENTATION CONTROL DEVICES ARE REQUIRED
5. THE SITE IS A DRY LAKE BED THAT CONTAINS NO NATIVE VEGETATION NO LANDSCAPING OR REVEGETATION IS PROPOSED
6. PROPOSED USE AFTER RECLAMATION OPEN SPACE POTENTIAL USE AFTER RECLAMATION CLAY MINE
7. RECLAMATION IS ONGOING
8. NO LAND OR RIGHT OF WAY WILL BE DEDICATED
9. NO STOCK PILES OR WASTE PILES WILL REMAIN ON SITE

Figure 2.2-11 Reclamation Plan, Clay Material Borrow Area, Broadwell Basin Residuals Repository, San Bernardino County, California

- Fences would be installed around the perimeter of the two borrow sites and the areas would be posted with signs noting any hazards. It is intended to final grade the side slopes so that potential hazards associated with slope steepness (slope failure or accidents on steep slopes) are eliminated.

- Any coarse or clay borrow materials that could not be used at the Repository would be spread and compacted at the bottom or along the side slopes to achieve the final grade shown on the mining plan.

- Because the lake bed does not have any vegetation, the reclamation of the clay borrow site does not include a revegetation component. The coarse material borrow site would be revegetated using plants native to the area. The revegetation effort would include local seed collection, sample plot studies (as needed) to determine the best method of revegetation over the proposed 20 to 50-year operational life of the facility, and revegetation efforts over the life of the facility and for a five to seven-year period after closure to obtain an adequate cover for the disturbed portions of the borrow area.

2.3 ALTERNATIVES TO THE PROPOSED ACTION

CEQA requires a discussion of a range of reasonable alternatives to the project, including alternative locations. The range of alternatives is governed by "rule of reason" that requires the EIR to set forth only those alternatives necessary to permit a reasonable choice. The Council on Environmental Quality (CEQ) regulations implementing NEPA and BLM's Handbook H-1790-1 also require identification of reasonable alternatives to the proposed action. Both environmental review procedures require consideration of a No-Project or No-Action alternative. Each alternative, except for the No-Action alternative, should represent an alternative means of satisfying the project objectives and of resolving environmental issues.

In response to these requirements, five alternatives to the proposed action, including the No-Action alternative, were developed as viable alternatives for detailed analysis. The first two represent realignments of the access road at two locations along the existing alignment of Crucero Road. These realignments have the potential to eliminate or reduce adverse environmental effects. The third examines an alternative transportation system of hauling the waste by railroad. The fourth evaluates the impacts of the Repository without an onsite treatment facility and the fifth is the No-Action alternative. These are described in the following sections.

2.3.1 Alternative 1 - Alternate Realignments of Crucero Road in Section 5

The owners of property along the existing Crucero Road alignment just north of Interstate 40 have requested that alternative alignments adjacent to their property be evaluated so they can lengthen their existing airplane runway. To accommodate this request, two alignments west of the existing Crucero Road in Section 5 were investigated.

The first alternative alignment (Alternative 1A) is approximately 1,700 feet west of the existing Crucero Road as shown in Figure 2.3-1. It would follow National Trails Highway west for 1,700 feet and then traverse due north about 2,700 feet to an existing dirt trail along the section line between Sections 5 and 32 that provides access to the major east-west natural gas pipeline that passes through this area. The proposed north-south realignment of Crucero Road and the existing dirt road (east-west) would be paved until the road intersects the existing Crucero Road alignment.

The second alternative alignment (Alternative 1B) would be constructed in the same manner, except the north-south portion of the road would be located along the section line (between Section 5 and 6). The entire portion north from National Trails Highway and east along the pipeline access road would be paved.

Alternatives 1A and 1B would both be constructed within a 60-foot-wide right-of-way and would have the same typical cross section and utility pole placement as the proposed action road alignment (see Figure 2.2-3).

If either of these alternative realignments are adopted, the new access road would pass by a mobile home instead of one single-family residence located north of the National Trails Highway along the existing alignment of Crucero Road. With either of these alternatives, the existing Crucero Road north of the house would be closed and revegetated by Broadwell Corporation up to the northern edge of Section 5. This would discourage any traffic from continuing to use the unpaved existing Crucero Road alignment in Section 5.

2.3.2 Alternative 2 - Improvement of Existing Crucero Road

Alternative 2 is being considered as means to potentially reduce impacts to WSA 252 by narrowing the right-of-way from 60 feet (proposed action) to 44 feet along the roughly three-mile stretch of road that is bordered on both sides by WSAs, and by elevating the existing Crucero Road above the 100-year floodplain instead of re-routing the access road around the edge of the floodplain.

The narrower right-of-way section would be constructed to current San Bernardino County minimum standards; that is, two paved lanes each 13 feet wide, five feet of paved shoulders on each side of the road, a two-foot-wide berm on the west side, and a six-foot-wide berm on the east side to contain the utility poles. The total minimum width of the right-of-way would be 44 feet

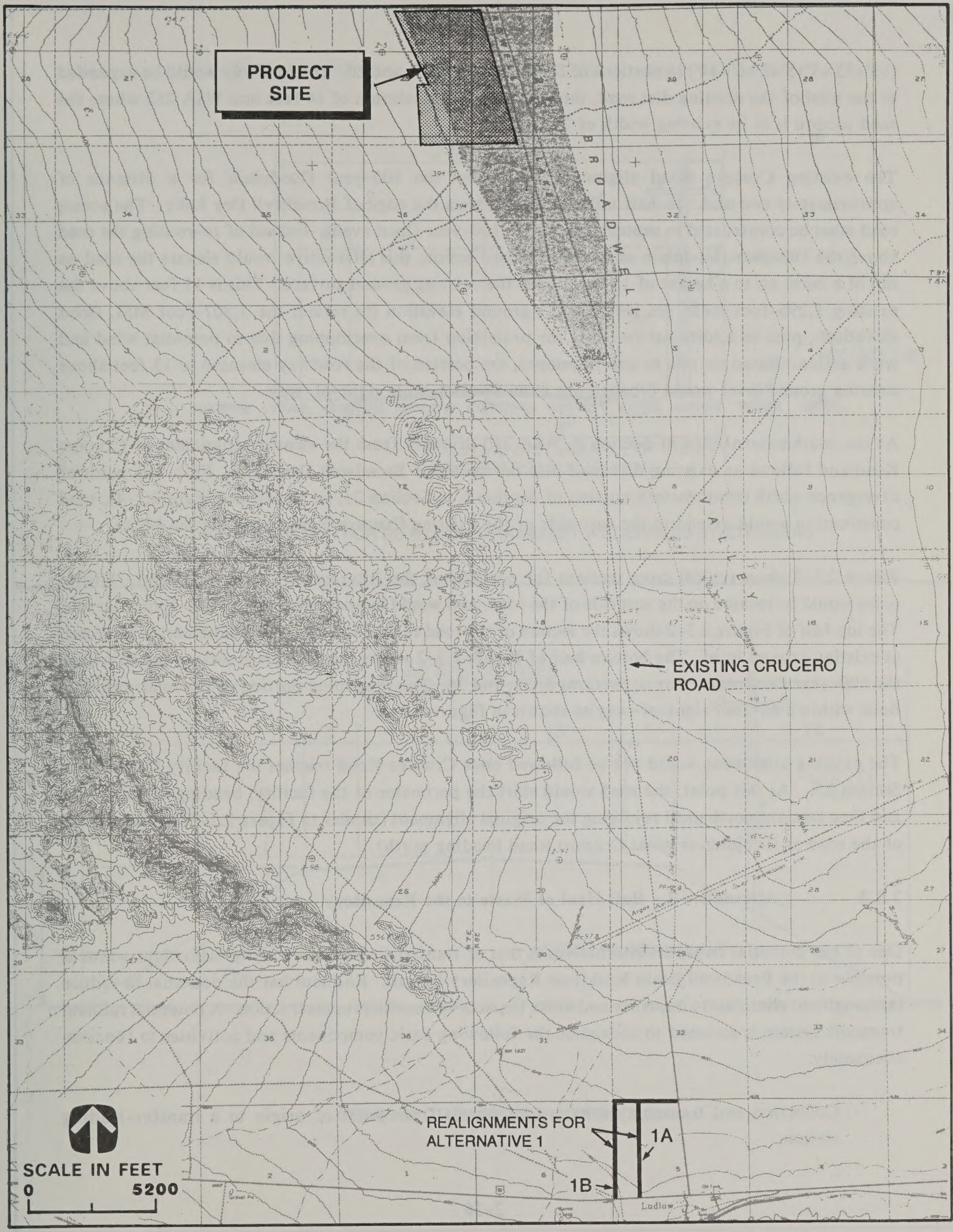


Figure 2.3-1 Alternate Realignments of Crucero Road in Section 5 Near Ludlow (Alternative 1)

(13'+13'+5'+5'+2'+6'=44') in portions of Sections 6, 7, 8, 17, and 20. The roadway would be expanded to the west of the existing dirt road, thus disturbing a maximum of 14 feet into WSA 252 where the road section is at its existing width of 30 feet.

The existing Crucero Road alignment lies below the 100-year floodplain for a distance of approximately two and one-half miles where it skirts the edge of Broadwell Dry Lake. The access road must be constructed to protect against the 100-year flood event. Instead of re-routing the road above the 100-year floodplain as in the proposed action, this alternative would elevate the road on top of a berm up to a height of 13 feet above the existing ground surface. This is 11 feet above the existing 1,296-foot mean sea level (MSL) ground elevation (to reflect the 1,307-foot MSL flood elevation), plus an additional two feet for protection from overtopping due to potential wind and wave action. Based on two to one sideslopes, the portion of the roadway elevated to 13 feet above existing ground level would broaden out to an 88-foot-wide right-of-way.

At the southeastern-edge of Section 6, WSA 250 diverges from the existing alignment of Crucero Road and follows an existing dirt road into the center of Broadwell Dry Lake. From the point of divergence north (southeastern portion of Section 6 to Section 25, as shown in Figure 2.2-4), road construction would extend to the east-side of the existing Crucero Road, avoiding the WSAs.

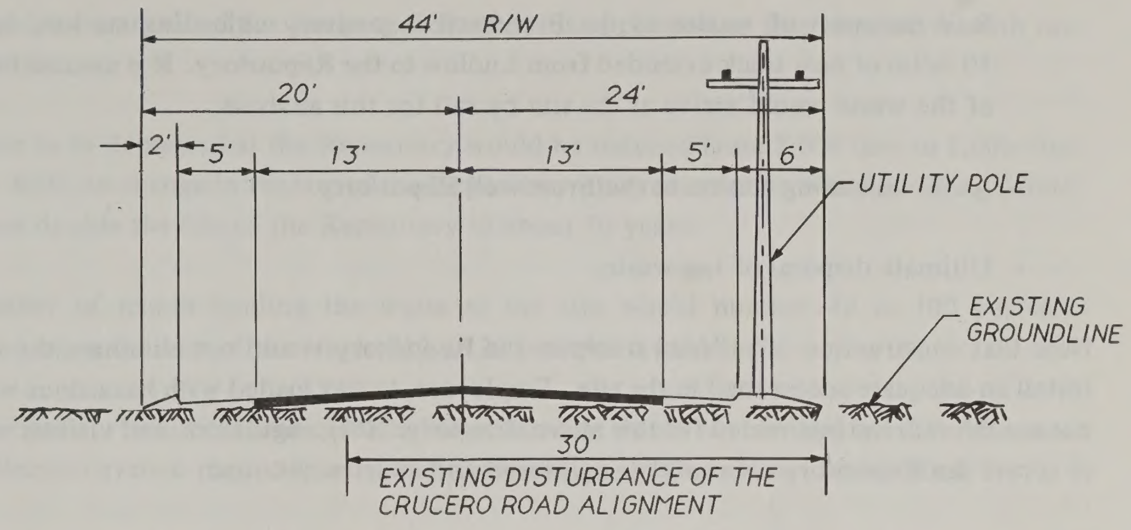
Figure 2.3-2 show typical cross sections for portions of the Alternative 2 road alignment. Utility poles would be located on the east side of the road, and would be spaced at 200- to 250-foot intervals. The top half of Figure 2.3-2 shows the section of the road reduced to a 44-foot width and constructed at existing ground level. The bottom half of Figure 2.3-2 shows the road cross section raised within the 100-year floodplain; that is, Sections 6, 31, and 36. The remaining portion of the road would be built within a 60-foot right-of-way as shown in Figure 2.2-3.

The existing alignment would not be followed once Crucero Road reaches the facility fenceline in Section 25. At this point, the road would skirt the perimeter of the facility, heading directly west and then straight north until rejoining the original alignment (similar to Figure 2.2-2 for the portion of the road as it rejoins original Crucero Road heading north).

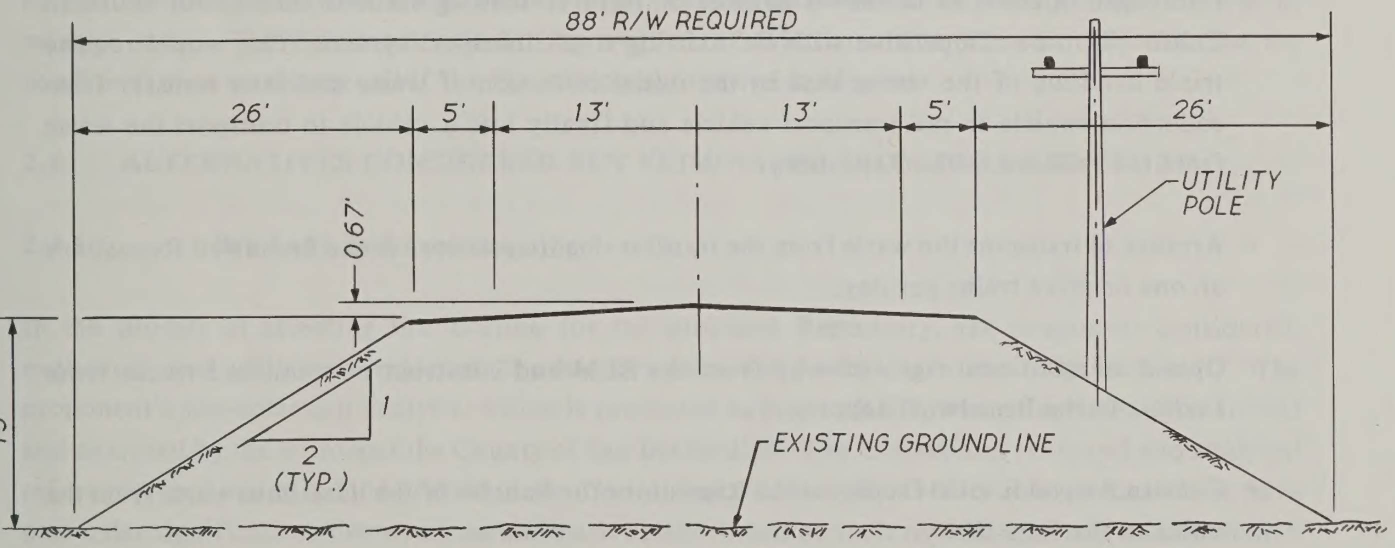
2.3.3 Alternative 3 - Rail Haul of Waste to the Repository

One of the potential transport alternatives is that of transporting as much of the hazardous waste as possible to the Broadwell Basin Residuals Repository by rail. Railhaul has the potential to reduce (although not eliminate) air quality and noise impacts versus the proposed action. A potential railhaul transport system is assumed to consist of the following basic components and activities to function adequately:

- Collection and transport of hazardous wastes from point of origin to a transfer-loading station.



CROSS SECTION FOR ROAD CONSTRAINED BY WILDERNESS STUDY AREAS



CROSS SECTION FOR ELEVATED ROAD

BB413

Figure 2.3-2 Typical Cross Sections for Portions of Crucero Road Improvements Under Alternative 2

- An unknown number of transfer-loading stations adjacent to railroad tracks throughout the Southern California hazardous waste generation area.

- Rail transport of wastes to the Broadwell Repository unloading station, including about 10 miles of new track extended from Ludlow to the Repository. It is assumed that 80 percent of the waste would arrive at the site by rail for this analysis.

- A rail unloading station at the Broadwell Repository.

- Ultimate disposal of the waste.

Note that construction of railroad tracks to the Repository would not eliminate the requirement to install an adequate access road to the site. Employees, trucks loaded with hazardous waste that could not use the railroad (estimated for this alternative to be 20%), regulators, and visitors would still have to access the Repository on a safely engineered and constructed road.

Hazardous wastes have not traditionally been shipped by rail in California, and, therefore, the infrastructure required to transport wastes by rail has not been established. For a railhaul alternative to be feasible, the Broadwell Corporation would have to operate the total system in a cost competitive manner with the existing disposal system. This would require Broadwell Corporation to construct and operate the following system components, which are not now in existence:

- Install and operate an unknown number of transfer-loading stations throughout Southern California to be competitive with the existing truck transport system. This would require triple handling of the waste; that is, the initial collection of waste and then transfer from collection vehicle to rail transport vehicle and finally into a vehicle to transport the waste from the railhead to the Repository.

- Arrange to transport the waste from the transfer-loading stations to the Broadwell Repository on one or more trains per day.

- Obtain an additional right-of-way from the BLM and construct new railroad tracks from Ludlow to the Broadwell Repository.

- Construct an additional facility at the Repository for transfer of the hazardous waste from the trains to the Repository.

2.3.4 Alternative 4 - Repository Without Onsite Treatment Facility and Reduction in Daily Wasteload

The project description provided for the proposed action is applicable to this alternative with the following exceptions:

- The waste to be deposited at the Repository would be reduced from 2,000 tons to 1,000 tons per day. With no change in the size of the Repository, this reduction in waste handling would more than double the life of the Repository to about 50 years.
- The number of trucks hauling the waste to the site would number 40 to 100 per day depending upon the size of the trucks (10 or 25 tons per truck).
- The stabilization/treatment area covering about 20 acres would not be required. The liner and fluid collection system required under the treatment facility would not be installed.
- Water requirements for the project would be reduced by 40,000 gallons per day, the amount of water required for treatment processes.

2.3.5 Alternative 5 - No-Action Alternative

The No-Action alternative is defined as not approving the application for a General Plan Amendment and issuance of a Conditional Use Permit to support the proposed facility and no right-of-way or mineral sales. The Environmental Setting sections of this document (Chapter 3.0) describe the conditions that would prevail if the No-Action alternative is adopted.

2.4 ALTERNATIVES CONSIDERED BUT ELIMINATED FROM DETAILED STUDY

2.4.1 Dry Lake Bed Locations

In the process of selecting the location for the proposed Repository, the proponent considered, evaluated, and ultimately rejected 20 other dry lake bed locations in the Mojave Desert. The proponent's site-selection analysis, which is presented as Appendix D, was independently reviewed and analyzed by the BLM and the County of San Bernardino. The County also reviewed and analyzed references in Appendix D to certain of the County hazardous waste facility siting criteria that have particular significance at many of the alternative sites. Based on their review, analysis, and discussion of the proponent's analysis, the agencies have concluded that the 20 alternative dry lake desert sites discussed in Appendix D are infeasible. Each of the alternative dry lake sites poses an insurmountable conflict with one or more of the central siting requirements: minimizing waste transit on minor roads and through populated areas; protecting groundwater currently or potentially used for human consumption; avoiding locations on active faults; avoiding conflicts with incompatible, existing uses of lake beds or the immediately adjacent areas; and avoiding or minimizing the impacts on the critical habitat of threatened species. Therefore, those alternative dry lake sites were eliminated from further detailed consideration.

As discussed at length in Appendix D, the proponent used eight threshold siting criteria in determining a location for its proposed Repository. In February 1990, after the proponent had made its initial selection of a site, the County published its CHWMP. That CHWMP contained 22 siting criteria, set forth on page 5-11 as Table 5-2 of the CHWMP (attached as Exhibit "B" to Appendix D). Of the 22 County criteria, the proponent's criteria and analyses had addressed numbers 1, 6, 8, 9, 10, 15, 18, 20, 21, 22. The discussion in Appendix E describes the consistency of the proposed Broadwell Dry Lake project site with all of the 22 County siting criteria. The County of San Bernardino has reviewed, analyzed, and discussed the extent to which its criteria are met by the Broadwell Dry Lake site, and has determined that the site is consistent with the CHWMP criteria (see Table 4.1.11-1).

Based upon its own analysis of the 21 dry lake bed alternatives (including the Broadwell Dry Lake site), the proponent purchased and now holds an option on the proposed project site at Broadwell Dry Lake. The proponent does not own or control any portion of any of the dry lake alternatives discussed in Appendix D, other than Broadwell Dry Lake. Although land ownership was not considered in determining the technical feasibility of the various dry lakes discussed in Appendix D, such ownership or control is one additional factor determining whether those alternative sites are infeasible for purposes of attaining the project's objectives.

2.4.2 Improvement of Existing Crucero Road Right-of-Way

This road alternative would involve constructing the access road totally within the existing Crucero Road disturbed alignment. The intent was to attempt to avoid impacts to WSAs. Under this alternative, a paved road section would be constructed within the existing narrow area between WSAs 252 and 250 (over a of road length of about three miles). This very narrow road differs from the Alternative 2 road (which also has a reduced width within the WSA-constrained road corridor) in that this road stays entirely with existing disturbance.

The existing disturbed area has a 30- to 32-foot width and would thus allow for a 26-foot-wide paved section and two- to three-feet variable width graded shoulder (Figure 2.4-1) which is less than the County standard of 5-foot shoulders to allow a vehicle to pull safety off the road on to a smooth, hard surface. Utility poles would be placed within the two- to three-foot road shoulder. This type of road can be constructed from the point where the two WSAs begin bordering on Crucero Road (middle of Section 20) to the south boundary of Section 6, where the road dips below the 100-year floodplain. Up to this point a paved road with narrow shoulders could be constructed without entering the two WSAs. However, it is infeasible to construct an elevated or flat road through the quarter-mile portion of Section 6 that lies below the 100-year flood elevation on the existing right-of-way without either

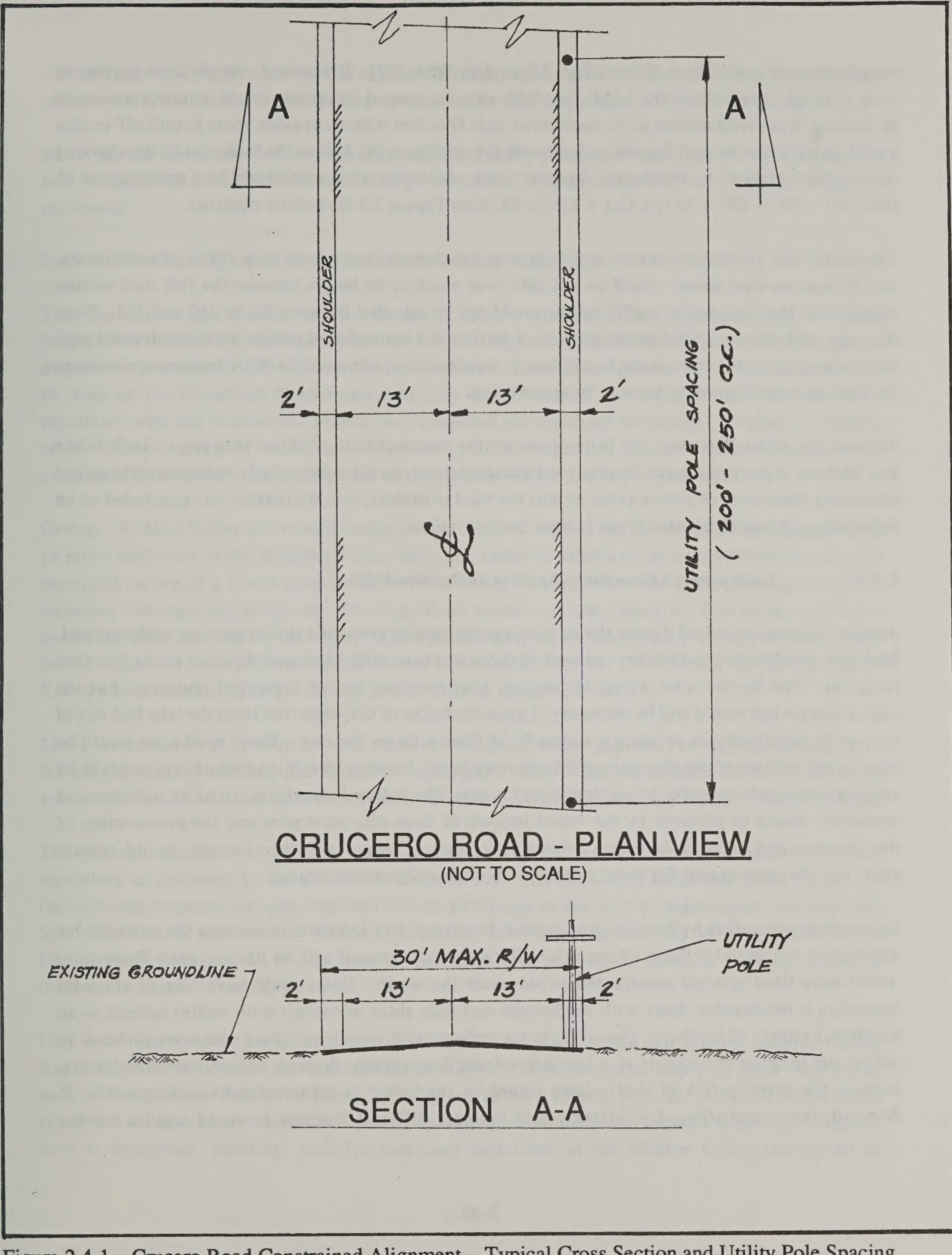


Figure 2.4-1 Crucero Road Constrained Alignment - Typical Cross Section and Utility Pole Spacing, Broadwell Basin Residuals Repository

encroaching on one or both WSAs (WSA 250 and/or WSA 252). If elevated, the elevated portion of road, at up to 13 feet above the 1,296-foot MSL existing ground elevation, would require a minimum of 26-foot-wide road section and shoulders at least five feet wide to provide room to pull off in case a vehicle has a mechanical failure. Along with the minimum 26-foot-wide footprint of the elevated road section (at a two to one slope), the total width of the disturbed area would be a minimum of 88 feet (26' + 10' + {2:1 x 13'} + {2:1 x 13'} = 88')(see Figure 2.3-2, bottom portion).

Therefore, this alternative cannot avoid some encroachment into one or both WSAs. Furthermore, this alternative road access would be less safe over much of its length because the full road section required by the County for traffic safety would not be installed between WSAs 250 and 252. Even if an elevated causeway road section instead of an elevated bermed road section were constructed over the last quarter mile between the two WSAs, it would extend out over the WSA because a minimum 36-foot road section would have to be constructed.

Because this alternative does not fully eliminate the encroachment problem into one or both WSAs and because it does not meet County road standards and would substantially reduce traffic safety (including placement of power poles within the road shoulder), this alternative was concluded to be infeasible and was eliminated from further consideration.

2.4.3 Underground Repository Facility at Broadwell Site

Another alternative raised during the scoping process was to construct the Repository underground. Basically, an underground facility requires all the same support facilities and the same ground surface footprint. The borrow sites would be smaller, thus reducing loss of biological resources, but the coarse borrow site would still be necessary. Large stockpiles of clay removed from the lake bed would have to be maintained in perpetuity unless BLM finds a buyer for clay. These spoil piles would be close to the volume of the aboveground Repository itself, because 16 million tons of clay needs to be excavated to create room for 16 million tons of waste. The reduced visual impacts of an underground repository would be replaced by the visual impacts of large clay stockpiles and the preservation of the aboveground support facilities. Aside from these changes all other impacts would remain generally the same except for those related to the subsurface environment.

Exposure to subsurface hydrologic conditions at Broadwell Dry Lake would increase the potential for undetected accidental releases of material. Both an aboveground and an underground Repository would have liner systems constructed to surround the waste. Both would have five of six sides (assuming a rectangular shape with the bottom and four sides in contact with waste) subject to an accidental release of leachate. However, in an underground repository, it may be more difficult to define the location and extent of a leachate release discoverable through vadose zone monitoring, because the investigation of that release would be conducted at greater depths underground. If detected, the remediation of a release would be more difficult, because it would require moving substantially more soil to access the release. Further, in an underground repository, the leachate release would be located much closer to groundwater, thus allowing less time for remediation.

Based on the above analysis, the underground repository alternative was rejected as an infeasible technology at the Broadwell site and is not given further consideration as a viable alternative in this document.

2.4.4 Aboveground Repository at the Hidden Valley Site

This alternative site, located approximately 12 miles northwest of the Broadwell site, has been proposed by Hidden Valley Resources, Inc., for locating an underground residuals repository for the disposal of dry, treated, and stabilized hazardous waste. Because the goals of this proposal are similar to those of the Broadwell Corporation, this site was evaluated to determine its suitability for a repository with the Broadwell Corporation's proposed aboveground technology. A short evaluation of the likely impacts of building and operating an aboveground hazardous waste repository as proposed by the Broadwell Corporation at the Hidden Valley Site is presented below.

Geology. Hidden Valley is a remote valley almost entirely surrounded by the Cady Mountains about 12 miles northwest of the Broadwell Lake site. The valley is filled with at least 370 feet of alluvium deposited on top of a basalt layer about 600 feet thick, which in turn lies upon a basement rock of unknown lithology and thickness. The Cady Fault trends east-west along the foot of the mountains bordering the south side of the valley. The Pisgah Fault, which includes an Alquist-Priolo Seismic Safety Zone, lies 1.5 miles west of the Hector exit on Interstate 40. The seismic risk at the Hidden Valley site is considered to be slightly greater than at Broadwell Lake.

There are no mines at or near the site. Mineral resources consist primarily of aggregate material in the alluvial fans, abundantly distributed throughout the valley. Clay deposits are limited to the playa area of only about 40 acres and therefore constitute a more limited resource than at Broadwell Lake.

The geologic structure of Hidden Valley is not suitable for the operation of a hazardous waste repository as proposed by the Broadwell Corporation. The Broadwell Basin Residuals Repository facilities are proposed on a dry lake bed to take advantage of the highly impermeable clay deposits. Sufficient area (a minimum of 300 acres required) with deep clay deposits is not available at the Hidden Valley site, which is underlain by basement rock and where uniform working surface is difficult to obtain for a disposal site.

Clay is also required for the construction of a berm for flood protection and as cover material for the Repository. In the absence of local deposits of clay, it would have to be imported from other areas, such as Troy Lake or Broadwell Lake. Although no impacts to local geologic resources would occur as a result of these requirements, the cost of operation would increase. Impacts of geologic hazards, such as seismicity, flooding, rock fracture, and landslides, at the Hidden Valley site would be somewhat greater than at the Broadwell site because of the close proximity of the Hidden Valley site to the Cady fault.

Hydrology. Groundwater is of limited quantity in Hidden Valley. A well drilled to 975 feet had a water level 900 feet below the surface upon completion. Water at Hidden Valley is extremely sparse compared with the supply at Broadwell Lake. The alluvium at Hidden Valley does not contain water, and the only available supply is from fractures in the basalt. The volume of the fracture reservoir is inadequate to provide a usable water supply for virtually any purpose except the present stock watering.

Any contamination escaping from the Broadwell Repository facility at this site would have less potential to affect groundwater, which lies at least 1,000 feet deep and is extremely limited in quantity. Contamination of surface water would be possible only in the rare times of heavy, intense rainfall, resulting in runoff to the small playa, or in the eastern end of the valley, runoff via Hidden Valley Wash. It is possible that water in the wash could reach the Mojave River Basin or even Soda Lake, which has a higher water table beneath the surface and an endangered fish species.

Noise. The Hidden Valley site, like the Broadwell Basin site, is relatively remote from human habitation. The nearest residence is approximately 15 miles to the west. The nearest town, Newberry Springs, is about 15 miles to the southwest.

The noise levels generated by the Hidden Valley facility would be about the same as those described for the Broadwell facility and would not be audible at existing noise-sensitive land uses, located 10 to 15 miles from the site. The noise levels at the nearest residence would be below the County's L_{eq} noise standard of 55 decibels on the A-weighted scale.

Biological Resources. Biological resources within the Hidden Valley site and along the Hector access route are similar to those occurring at the Broadwell Lake site, particularly the coarse material borrow site. The creosote bush-burrobush *(Larrea tridentata-Ambrosia dumosa)* plant association is nearly ubiquitous throughout the study site. These two shrubs dominate the sandy flats of Hidden Valley and the bajadas along the access route. They are also present in washes and on hillslopes and ridges, but often with additional shrub species such as Mormon tea (*Ephedra californica*) and armed senna (*Cassia armata*).

Sensitive wildlife species residing at the Hidden Valley site and adjacent Cady Mountains include American badger, desert tortoise, and bighorn sheep. The Cady Mountains bighorn sheep herd, estimated at 25 to 50 sheep, utilize the steep mountainous terrain to the north and south of Hidden Valley. Migration corridors have been identified at both the east and west ends of Hidden Valley.

Desert tortoise habitat was identified as fair to poor, with densities ranging from zero to 50 tortoises per square mile in the Hidden Valley area. The greatest densities (11 to 50 tortoises per square mile) occur in the western portion of the valley and in the undulating to gently rolling hills along the northern half of the access route. The Hidden Valley site is outside all major and minor population concentrations (Stewart 1987). Additional sensitive wildlife species observed within Hidden Valley include prairie falcon, LeConte's thrasher, and black-tailed gnatcatcher. Chukar, an introduced upland game species, was also observed. Sensitive species expected include golden eagle (*Aquila chrysaetos*) and Townsend's big-eared bat (*Plecotus townsendii*).

The diverse topographic relief of the Cady Mountains and high-quality habitats with the wash-dissected rocky bajadas provides suitable habitat for a greater density and increased species richness of wildlife at the Hidden Valley site than occurring in similar habitat types in the Broadwell Basin. Therefore, project development within the Hidden Valley area would have a greater impact on localized vegetation and resident wildlife than development within the Broadwell Basin. Initial development of a Residuals Repository site as designed for the Broadwell Basin site would result in the loss of approximately 316 acres of creosote bush-burrobush habitat. In addition, an undetermined amount of habitat would be lost to borrow areas and access road alignment. This disturbance of land includes foraging habitat for raptors and badgers, loss of small mammal prey base, and the incremental loss of desert tortoise habitat. Undoubtedly, construction of the Repository facility and corresponding increase in human activity would cause at least temporary displacement of bighorn sheep from the perimeter of the valley. Because the south Cady Mountains contain the most extensive area of critical habitat, increased human disturbance may permanently displace the bighorn sheep herd to other isolated ranges. However, because of the limited amount and isolation of suitable habitat, these areas may be already at carrying capacity. This may have serious ramifications for the long-term survival of the population.

Impacts to the desert tortoise may occur during construction of the facility and during subsequent operation as a result of road kills and collections. Travel along the access route may also serve as a partial barrier to tortoise passage, thus segregating the population and interrupting natural movements and gene flow. However, as habitat quality is described as poor to fair, and as estimated population densities are relatively low, impacts are probably negligible since this population is well outside the periphery of any major tortoise population.

Cultural and Paleontological Resources. A preliminary cultural resources evaluation (overview) of Hidden Valley was conducted by Mark Q. Sutton of the Cultural Resource Facility at California State University at Bakersfield (Sutton 1990). Sutton located one prehistoric site, P179-3, SBCM-671, consisting of a metate, lithic flakes, three concentrations of rocks (possibly fire-affected), and at least four obvious potholes. The site was recommended as potentially eligible for the National Register of Historic Places because of its potential to contribute data to significant regional research questions.

A cultural resources records search conducted by the San Bernardino Archaeological Information Center (San Bernardino County Museum) indicated that no formal archaeological investigations have been undertaken in the Hidden Valley area (Sutton 1990: 14). The check also indicated that no sites have been formally recorded within the valley, although two have been reported (Sutton 1990:14). A BLM Class II cultural resources inventory of the region has been conducted (Brooks et al. 1981). It apparently included survey transects in the Cady Mountains. The locations and results of such transect surveys, however, were not reported to the San Bernardino Archaeological Information Center and, therefore, no assumptions can be made that the Hidden Valley area was inventoried.

Because of the high probability for cultural resources in the Hidden Valley area, the potential impacts to cultural resources are expected to be greater at the Hidden Valley site than at the Broadwell site, if similar facilities are constructed at either site.

Air Quality. The Hidden Valley site is only 12 miles west of the Broadwell Basin site and in the same air basin (Southeast Desert Air Basin [SEDAB]) as is the Broadwell site. The ambient air quality at the Hidden Valley site is, therefore, similar to that described for the proposed action. If Broadwell Basin Residuals Repository facilities are built at the Hidden Valley site, overall air quality impacts would be generally the same as for the proposed action. Minor but increased air quality impacts would occur at the Hidden Valley site because of two factors: (1) construction of a longer access road between Interstate 40 and the project site, and (2) likely transportation of clay material and water on dirt roads from longer distances than at the Broadwell site. These impacts would either be short term (from road construction) or local (in the SEDAB only). Regional air quality impacts of truck traffic would be the same at the two sites.

Scenic/Visual Resources. If the proposed project is located at the Hidden Valley site, the visual impacts to the existing scenic/visual resources would be minimal. The only significant viewing area is the Interstate 40 travel corridor, which is more than 10 miles from the valley. Hidden Valley is an enclosed desert basin surrounded by low mountains.

The proposed access route, from the Hector interchange to Hidden Valley, would be very visible from Interstate 40 because of the incline of the rising topography, which increases its exposure. Hence, the visual impact of the access route to the Hidden Valley site would be slightly greater than at the Broadwell site.

Transportation/Circulation. The Hidden Valley site is accessed from Interstate 40 through a cloverleaf freeway interchange at Hector, California. The site is approximately 10 miles north of Interstate 40, and would be accessed by a fully improved, all-weather, two-lane paved road to accommodate the proposed traffic volume. The primary route utilized by the truck traffic from the urban centers would be the same as those for the proposed action.

Hector Road is presently an unimproved dirt road limited to off-highway vehicles and livestock grazing support vehicles. The daily increased traffic generated by either facility location is assumed to be the same and the increased traffic would be using the same primary route to access both sites. As a result, the impacts for this alternative would be the same as those for the proposed action.

Land Use. The Hidden Valley site would require a 60-foot right-of-way for construction of an access road. The entire project area and all but the last three miles of the right-of-way in the vicinity of Interstate 40 are within the Cady Mountains WSA 251. The proposed Repository at the Hidden Valley site, as with the proposed action site, would be on private land; however, unavoidable impacts to WSA 251 would occur as a result of road construction.

Public Health and Safety. The Hidden Valley site, similar to the Broadwell site, is relatively remote from human habitation. The nearest town, Newberry Springs, is approximately 15 miles to the southwest. The public health impacts and the measures to mitigate them would be the same as described for the proposed action.

As discussed above, a number of physical and environmental constraints, such as lack of sufficient area with deep clay deposits and lack of local water supply, and relatively higher impacts on sensitive biological resources (desert tortoise, American badger, and bighorn sheep), cultural resources, air quality, visual resources, and land use (encroachment onto WSA 251) lead to the conclusion that the Hidden Valley site is not suitable for the type of technology designed by the Broadwell Corporation for a residuals repository. This site was, therefore, eliminated from detailed study. It should be noted, however, that the same conclusions are not valid for the underground facility proposed by the Hidden Valley Resources. The analysis was not intended to determine the relative merits of the two technologies proposed for the two sites.

2.5 Summary of Environmental Impacts

The environmental impacts and mitigation measures to reduce the impacts have been summarized in Table S-1 of this document and are not repeated here (see Environmental Consequences and Mitigations Section of the Summary). If no mitigation measures are implemented, significant impacts from the proposed action would occur on geology, hydrology, noise, biological resources, cultural and paleontological resources, air quality, land use, and public health and safety. With the implementation of the mitigation measures identified in this document, all impacts except on biological resources and air quality would be reduced to a level of non-significance. Impacts on air quality would remain significant and unavoidable even after mitigation measures are taken. However, they would be within acceptable limits established by the regulatory authorities. Detailed discussions of environmental consequences of the proposed action and its alternatives are evaluated in Chapter 4.0 for each of the 12 issue categories identified through the scoping process.

3.0 ENVIRONMENTAL SETTING/AFFECTED ENVIRONMENT

3.0 ENVIRONMENTAL SETTING/AFFECTED ENVIRONMENT

3.1 INTRODUCTION

The following sections provide information on existing environmental conditions associated with the proposed Broadwell Basin Repository site. This information is primarily based on a number of reports that were prepared by several technical consultants to support review of the Broadwell Corporation's application to the County of San Bernardino for approval of site and facilities plans for the proposed project (For a listing, see Table 6-1). Tetra Tech and the lead agencies independently evaluated these reports for their technical content and supplemented them with field verifications, literature reviews, and contacts with agencies and individuals, where necessary.

3.2 GEOLOGY

Broadwell Lake is located in the Mojave Desert in central San Bernardino County, California. It lies within the Mojave geomorphic province in an area dominated by northwest-southeast trending mountain ranges separated by intermontane basins having the same general trend. With respect to topography and structure, the area is similar to the Basin and Range province to the northeast.

Broadwell Lake lies in the north-central portion of a basin bordered by low hills on the south, the Cady Mountains on the west and northwest, and the Bristol Mountains on the east and northeast. It lies south of a drainage area which trends north toward and into the Mesquite Lake area of the Mojave River Basin.

Broadwell Lake, as it is termed on U.S. Geological Survey maps, has also been referred to as Broadwell Dry Lake. Geomorphically, such a dry lake bed is referred to as a playa.

Rocks of the surrounding mountains consist mostly of granitic rocks of Jurassic and Cretaceous ages and volcanic rocks, including dacite, andesite, and basalt, of Miocene age. A few isolated patches of limestone and metasediments of Paleozoic age probably exist as roof pendants over the Jurassic-Cretaceous intrusive rocks.

The materials of the central portion of Broadwell Basin consist of unconsolidated alluvial and lacustrine sediments. The surficial sediments are Holocene in age. Pleistocene sediments lie under these, and it is likely that Pliocene and Miocene sediments or rocks lie in turn below these. The degree of consolidation of the lowest sediments is unknown.

The geologic history of Broadwell Basin is complex and not fully understood. The existing features began to take shape 6 to 10 million years ago during the Miocene Epoch and have continued to form up to the present day. The general region is seismically active, with seismic activity occurring along faults, the largest of which generally trends in the same direction as the mountain ranges and the basins. The processes of erosion and sedimentation are likewise active, especially during sudden, intense precipitation events.

3.2.1 Geomorphology

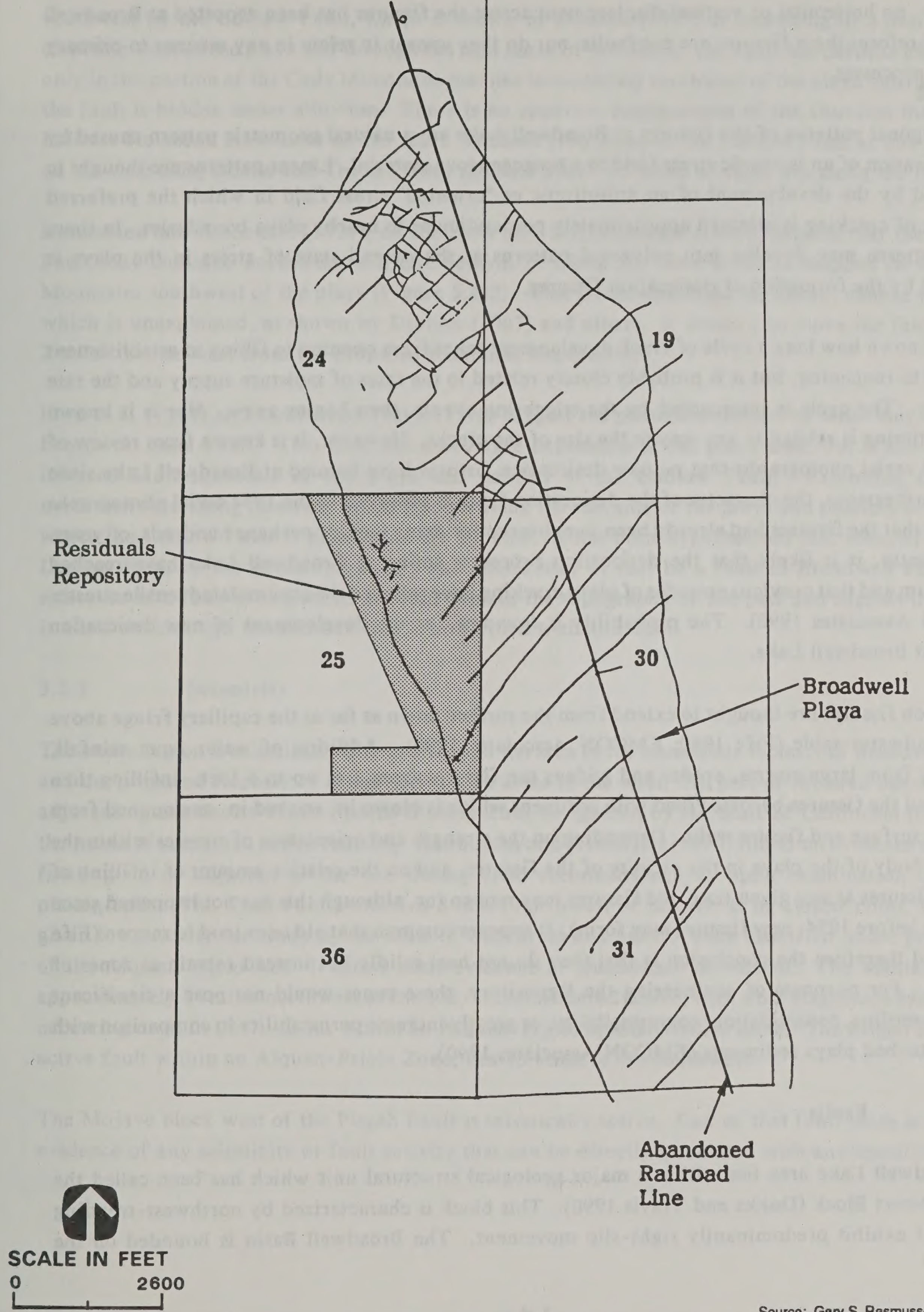
3.2.1.1 Topography and Geomorphic Features

Broadwell Lake lies in a topographically closed basin which has about 90 feet of surface relief from the playa surface to the lowest point in the surrounding rim, which is in a pass 2 miles north of the playa. Because this feature is unnamed, the name Broadwell Pass will be used here for this pass for purposes of identification in this discussion. The playa is 4 miles long and averages 1 mile wide. Its surface lies at an elevation of 1,296 feet and is flat throughout. Alluvial fans form the slopes from the playa to the base of the surrounding mountains, which is at 1,400 to 2,000 feet, depending on the distance from the playa. Individual alluvial fans coalesce toward the center of the basin to form larger depositional features called bajadas. Pediments, which are erosional surfaces, may exist in some areas near the mountains. The bajadas are steepest nearest the mountain front and become flatter toward the playa, sloping at an average of about 120 feet per mile. The mountains rise to well over 2,000 feet around the basin and are over 3,000 feet in some areas.

3.2.1.2 Desiccation Cracks

The Broadwell playa contains a number of features that have been referred to as desiccation cracks (Fife 1980; Bortugno and Spittler 1986). Desiccation cracks are large fissures that are common in many playas of the Mojave Desert. They have been recognized for many years but are still not completely understood. Fife lists faulting, subsidence, uplift, massive desiccation, or a combination of these as possible factors in their formation and believes massive desiccation to be the most important cause. The technical investigation performed for the project by Rasmussen and Associates (1990) and EMCON Associates (1990) identified desiccation cracks at and near the site of the proposed repository (Figure 3.2-1). At present, the cracks are filled, but their location is clearly evident by lines of vegetation along them. Water is available for the plants, which grow along the cracks but nowhere else on the playa surface. Roots and branches of plants trap sediment, particularly wind-blown sediment, and cause a topographically raised ridge to form along the trace of the crack. Desiccation cracks do not appear to extend very far beyond the edges of the lake bed in areas where they have been mapped but were noted by Rasmussen and Associates as being present at least a short distance beyond the east edge of the playa.

Desiccation cracking occurs via drying of water-bearing sediments proceeding downward from the surface and setting up stresses as dehydration proceeds from near saturation to an almost dry condition. Cracks also may develop as a result of stress created by an event such as an earthquake.



Source: Gary S. Rasmussen & Associates 1990.

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Figure 3.2-1 Desiccation Cracks in Broadwell Playa, San Bernardino County, California

However, no horizontal or vertical displacement across the fissures has been reported at Broadwell Lake; therefore, these fissures are not faults, nor do they appear to relate in any manner to primary tectonic processes.

The polygonal patterns of the fissures at Broadwell Lake are a natural geometric pattern caused by the application of an isotropic stress field to a homogeneous material. Linear patterns are thought to be caused by the development of an anisotropic or "oriented" stress field in which the preferred direction of cracking is oriented approximately perpendicular to nearby playa boundaries. In time, linear patterns may develop into polygonal patterns as the overall state of stress in the playa is modified by the formation of desiccation fissures.

It is not known how long a cycle of crack development takes from opening to filling to establishment of plants to reopening, but it is probably closely related to the rates of moisture supply and the rate of drying. The cycle is interrupted by the triggering events, then begins anew. Nor is it known whether timing is related in any way to the size of the cracks. However, it is known from review of historical aerial photographs that no new desiccation fissures have formed at Broadwell Lake since 1954. Furthermore, the character of the desiccation fissures observed in the 1954 aerial photographs indicates that the fissures had already been in existence for many tens, or perhaps hundreds, of years. Consequently, it is likely that the desiccation processes acting at Broadwell Lake have reached equilibrium and that previous episodes of playa cracking have relieved the accumulated tensile stresses (EMCON Associates 1990). The probability is thus low for the development of new desiccation fissures at Broadwell Lake.

Desiccation fissures are thought to extend from the surface down as far as the capillary fringe above the groundwater table (Fife 1980; EMCON Associates 1990). Addition of water from rainfall, especially from large storms, erodes and widens the fissures from 1 to up to 6 feet. Infilling then occurs, and the fissures become filled with sediment which is blown in, washed in, or sloughed from the playa surface and fissure walls. Depending on the strength and orientation of stresses within the sediment body of the playa in the vicinity of the fissures, and on the relative amount of infilling of existing fissures at any given time, old fissures may reopen (or, although this has not happened since sometime before 1954, new fissures may form). It appears common that old ones tend to reopen (Fife 1980), and therefore the conclusion is that they do not heal solidly but instead remain as zones of weakness. For purposes of engineering the Repository, these zones would not pose a significant hazard of settling, consolidation, compressibility, or greatly increase permeability in comparison with the undisturbed playa sediments (EMCON Associates 1990).

3.2.2 Faults

The Broadwell Lake area lies within a major geological structural unit which has been called the Mojave Desert Block (Dokka and Travis 1990). This block is characterized by northwest-trending faults that exhibit predominantly right-slip movement. The Broadwell Basin is bounded on the southwest by the Ludlow Fault, which is shown by Dibblee (1967) as extending in a nearly north direction west of the playa and through the pass north of the playa. The fault has definite expression only in the portion of the Cady Mountains that lies immediately southwest of the playa; north of there the fault is hidden under alluvium. There is no apparent displacement of the alluvium that would indicate Holocene movement on the fault. Dibblee (1967) shows the Ludlow Fault as downthrown on the west side; Dokka and Travis (1990) indicate about 1.2 miles of right slip along the fault.

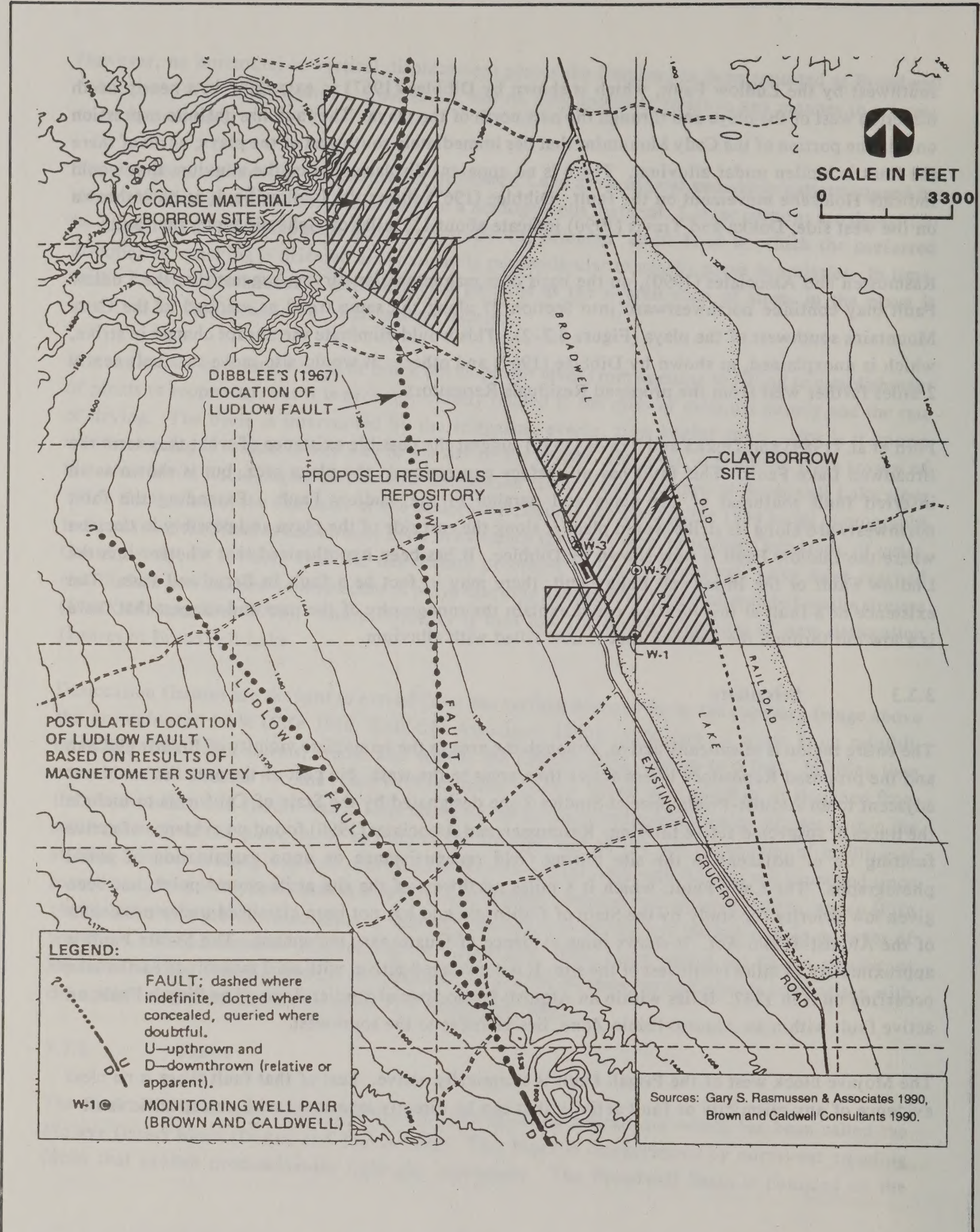
Rasmussen and Associates (1990), on the basis of a magnetometer survey, suggest that the Ludlow Fault may continue northwestward into Section 27 along the same trend as mapped in the Cady Mountains southwest of the playa (Figure 3.2-2). This would eliminate the abrupt change in strike, which is unexplained, as shown by Dibblee (1967) and others. It would also move the fault nearly 2 miles farther west from the proposed Residuals Repository.

Ford et al. (1989) and Dokka and Travis (1990) suggest the possible existence of what they term the Broadwell Lake Fault. This fault has no surface expression at the playa area, but is shown as an inferred fault southeast of the playa and parallel to the Ludlow Fault. Extending the fault northwestward along its strike would place it along the east side of the playa and possibly in the pass where the Ludlow Fault is now shown by Dibblee. It has been hypothesized that whether it is the Ludlow Fault or the Broadwell Lake Fault, there may in fact be a fault in Broadwell Pass. The existence of a fault at this location could explain the topography of the pass and suggest that there is a low cut through the bedrock that is now filled with alluvium.

3.2.3 Seismicity

The entire region is seismically active, although the area in the immediate vicinity of Broadwell Lake and the proposed Repository is less active than areas to the west. No part of the area lies within or adjacent to an Alquist-Priolo Special Studies Zone designated by the State of California to include the traces of suspected active faulting. Rasmussen and Associates (1990) found no evidence of active faulting on or adjacent to the site during field reconnaissance or upon examination of aerial photographs. The Cady Fault, which is 8 miles northwest of the site at its closest point, has been given low priority for study by the State of California and has not been classified under provisions of the Alquist-Priolo Act. It shows some evidence of Quaternary movement. The Manix Fault is approximately 14 miles northwest of the site. It is considered active, with a 6.2 magnitude earthquake occurring on it in 1947. It lies within an Alquist-Priolo Special Studies Zone. The Pisgah Fault, an active fault within an Alquist-Priolo Zone, lies 15 miles to the southwest.

The Mojave block west of the Pisgah Fault is seismically active. East of that fault there is no clear evidence of any seismicity or fault activity that can be directly associated with any specific fault


SCALE IN FEET
0
3300
COARSE MATERIAL BORROW SITE
DIBBLEE'S (1967) LOCATION OF LUDLOW FAULT
BROADWELL
DRY LAKE
CLAY BORROW SITE
PROPOSED RESIDUALS REPOSITORY
OLD
RAILROAD
W-3
W-2
W-1
LUDLOW FAULT
POSTULATED LOCATION OF LUDLOW FAULT BASED ON RESULTS OF MAGNETOMETER SURVEY
EXISTING CRUCERO ROAD
LEGEND:
FAULT; dashed where indefinite, dotted where concealed, queried where doubtful.
U—upthrown and D—downthrown (relative or apparent).
W-1
MONITORING WELL PAIR (BROWN AND CALDWELL)
BB304

Sources: Gary S. Rasmussen & Associates 1990, Brown and Caldwell Consultants 1990.

Figure 3.2-2 Postulated Locations of Ludlow Fault Near Broadwell Dry Lake, San Bernardino County, California

(Rasmussen and Associates 1990). Seismic activity in the vicinity of the proposed Repository appears to be infrequent and random.

Rasmussen and Associates (1990) summarize the possible seismic activity on the known active faults as follows:

Fault	Closest Distance (miles)	Maximum Credible Earthquake	Maximum Ground Acceleration	Maximum Probable Earthquake	Maximum Ground Acceleration
Cady	8	6.7	0.22g	6.3	0.18g
Manix	14	6.7	0.13g	6.3	0.10g
Pisgah	15	7.0	0.15g	6.5	0.11g

Note: g=acceleration caused by gravity.

3.2.4 Mineral Resources

The major mineral resources of the Broadwell area are aggregate and clay. The aggregate consists of sand, gravel, and coarser fragments present on the alluvial fans surrounding the lake bed. These are derived from the bedrock of the surrounding mountains and are segregated according to size as a function of stream energy from the occasional flows of streams down the alluvial fans. Most of the surrounding sources of the fan material consist of granite and of both shallow intrusive and volcanic dacite and andesite. The gross composition of these rocks is approximately the same, the main difference being grain size. The utility of these rocks for aggregate is good.

Clay resources are present on the lake bed surface. The clay particles are deposited by wind and by water flowing off the alluvial fans, which by the time it reaches the playa is transporting mainly clays. Because of the low hydraulic conductivity of clay, the material is suitable as a component for use in the composite liner system for the waste modules.

The Bureau of Land Management (BLM) has classified Broadwell Lake and its margins as "prospectively valuable" for sodium because the area has conditions similar to other areas where sodium has been extracted. The groundwater of the playa has high amounts of sodium in solution. There do not appear, however, to be recoverable quantities of sodium salts on the playa surface. The trenching techniques used at Bristol Lake possibly could be used to concentrate brine leading to the recovery of sodium or other salts.

Evaporites have been mined from the lake beds of many playas in the Mojave Desert and Basin and Range areas, including Bristol Lake, Searles Lake, and others. These deposits have included sodium chloride, borax, and trona. No attempt has been made to mine evaporites from the Broadwell dry lake because the only evaporites discovered have been thin layers of gypsum which are uneconomic to recover.

The Old Dominion Mine is in the northwest quarter of Section 23, Township 9 North, Range 7 East, about one-quarter mile west of the proposed aggregate borrow area. Coatings of chrysocolla, a non-ore copper silicate, were reported by Dibblee from the prospect. Chalcopyrite also may be present. Rasmussen and Associates (1990) state that the mine has apparently been idle for some time.

Celestite (strontium sulfate) was mined in small quantities during World War I from a locality on the south side of the Cady Mountains. The importance of this deposit was minor, and no other deposits are known from the area.

3.3 SOILS

3.3.1 Engineering Properties

Broadwell Basin is a playa that lies within the geomorphic province known as the Mojave Desert. The proposed site occurs within an elongate north-northwest-trending basin composed of Holocene-age alluvial materials. Along the basin margins, Pleistocene-age soils occur as alluvial fans (Rasmussen and Associates 1990).

Dry silty clays occur within the first foot of the playa surface and form a crust over the surface. Below this, the soils remain predominantly silty clays and are very massive, indicating a lack of bedding. From approximately 6 feet to 7 feet, very fine-grained sands are encountered. This indicates that perhaps the fine sand material was deposited on a non-uniform surface or that it is offset (Rasmussen and Associates 1990). This granular layer was also noted at depths of 23 to 37 feet. Between the granular layers, fine-grained soils may be found. Evaporite layers composed predominantly of calcium sulfate (gypsum) are located at various depths through the playa profile.

The coefficient of permeability for the fine-textured soils is in the range of $1x10^{-5}$ to $1x10^{-9}$ centimeters per second (cm/sec), indicating that these soils are relatively impermeable. Based on expansion testing, the clayey subsoils have a "high" potential for expansion in accordance with the UBC standard 29-2. For the coarse material found within the playa profile, the coefficients of permeability may be assumed to be slightly to highly permeable and will be greater to much greater than $1x10^{-7}$ cm/sec (Rasmussen and Associates 1990).

The soils associated with the alluvial fans that border the playa to the north are poorly sorted unweathered sands and gravels. This area has been identified by the BLM as having the potential for saleable sand and gravel (Rasmussen and Associates 1990). Fan gravel is generally composed of coarse gravel of unsorted boulders, cobbles, and pebbles in a coarse sandy matrix. These materials are deposited as alluvial fans because of runoff as a result of torrential down pours. These fans tend to grade downslope into alluvium (Dibblee 1967).

3.3.2 Soil Erosion Potential

The soils associated with playas consist of an undrained flat landscape in a closed basin. The soils associated with playa environments tend to be devoid of vegetation and can be strongly saline-alkaline. Playa areas are flooded for short periods after highly intense rains and the resulting water does not permeate into the soil profile, remaining on the surface until it evaporates. As a result of a clayey texture, soils associated with playas have very low permeability (U.S. Department of Agriculture 1986).

A consequence of a level surface is that salts commonly crust on the surface. However, because of the fine texture of playa soils, the hazard of blowing dust is very high when these soils are dry after the water evaporates (U.S. Department of Agriculture 1986).

The soils that compose the alluvial fans in the proposed project area are well drained and moderately well-drained (U.S. Department of Agriculture 1986). These soils are derived predominantly from granitic parent material. Runoff is medium and the hazard of water erosion is slight. These soils are stony or gravelly and are not subject to wind erosion and, therefore, the erosion potential is slight to none for these soils (U.S. Department of Agriculture 1986).

3.4 HYDROLOGY

The hydrology of the Broadwell Lake Basin is important because it is the movement of water that creates the potential for mobilization of hazardous wastes in the event of leakage into or out of the Repository. The hydrology of the area includes the study of both surface water and groundwater.

3.4.1 Regional Overview

3.4.1.1 Precipitation

The annual precipitation in Broadwell Basin is between 3 and 4 inches per year, almost entirely in the form of rain. The closest official measuring station is Barstow, where rainfall averages slightly over 4 inches per year. Broadwell Basin probably receives somewhat less, perhaps 3.5 to 4 inches.

3.4.1.2 Surface Drainage

The entire drainage basin has an area of 156,089 acres. There are no perennial streams in the basin. All of the watercourses are ephemeral, and individual stream channels are ill defined. All drainage flows into the playa.

Thompson (1929) mentions the presence of "a narrow pass just north of Broadwell, which is filled with coarse subangular gravel and sand. This alluvium has been washed in from the mountains on each side in such a way as to completely block the drainage from Broadwell Valley, which otherwise would flow northward into the much lower Soda Lake Basin." Thompson refers here to surface drainage.

While it is dry most of the time, the playa contains water to shallow depths for some days after intense desert rainstorms. Such events normally occur, at the most, only a few times each year. The lowest points in the playa are next to the abandoned bed of the Tonopah and Tidewater Railroad; these are evidently borrow pits left from the construction of the railroad bed.

3.4.1.3 Groundwater

The groundwater in the Broadwell Basin falls roughly into two groups characterized mainly by movement and quality. One groundwater body lies in the alluvial fans and the other in the playa sediments. Groundwater in the alluvial fans is moderately fresh and has a relatively high hydraulic gradient. Groundwater in the playa sediments is saline and has a lesser known gradient. Water falls as precipitation over the entire area, running off fairly rapidly from the mountains to the alluvial fans, as well as falling directly onto the fan surfaces. It infiltrates the relatively permeable fan sediments, moves downward to the groundwater table, and then flows under a moderately high head toward the playa sediments. Some water from storms recharges the groundwater from the ephemeral streambeds on the fans, by infiltration from the playa surface, and by way of any open desiccation crack penetrating the playa surface (either by direct connection to the aquifer through the crack or through lateral movement). The playa sediments, however, have a very low vertical hydraulic conductivity and the tendency is for a large portion of the water collecting on the playa surface after a large rain to evaporate rather than soak in. Evaporation from the playa may leave thin layers of salts at the surface, which may later be buried by sediment and preserved as thin evaporite layers or be carried downward in solution by water slowly infiltrating the playa sediments.

For purposes of initial study for the project, one test well and a number of monitoring wells were installed at and near the proposed site. The purpose of the test well was to determine the availability and quality of water supply for construction and operation of the facility; this is discussed in Section 3.9.

The depth to water in the playa is approximately 80 feet. The degree to which fluctuation of the groundwater table occurs in response to precipitation is not presently known.

The quality of water in the test well west of the playa (in alluvium) is fair but suitable for the project construction and operation except for drinking water (Section 3.9). Groundwater in the playa sediments is highly saline. Concentrations of total dissolved solids vary depending on the location but range from nearly as saline to three or four times as saline as seawater. The salinity of playa groundwater precludes its use for any purposes of the project or for other water supply.

There may be a physical connection between Broadwell Basin and basins to the north, which would include the Mesquite Lake area, the Mojave River sink, and Soda Lake. The overall tectonic analyses of the area, as well as the probable existence of a fault through the pass (whether the Ludlow or Broadwell Lake Fault), constitute some evidence for a connection. Thompson (1929) asserts that "the alluvium in the pass reaches 100 feet or more below the playa." This means that there must be at least 180 feet of alluvium in the pass, which is about 1 mile wide at its narrowest point. Based on the usual configuration of mountain-front slopes in the region, it is likely that the bedrock is quite deep in the pass and that 180 feet represents a minimum thickness of alluvial fill.

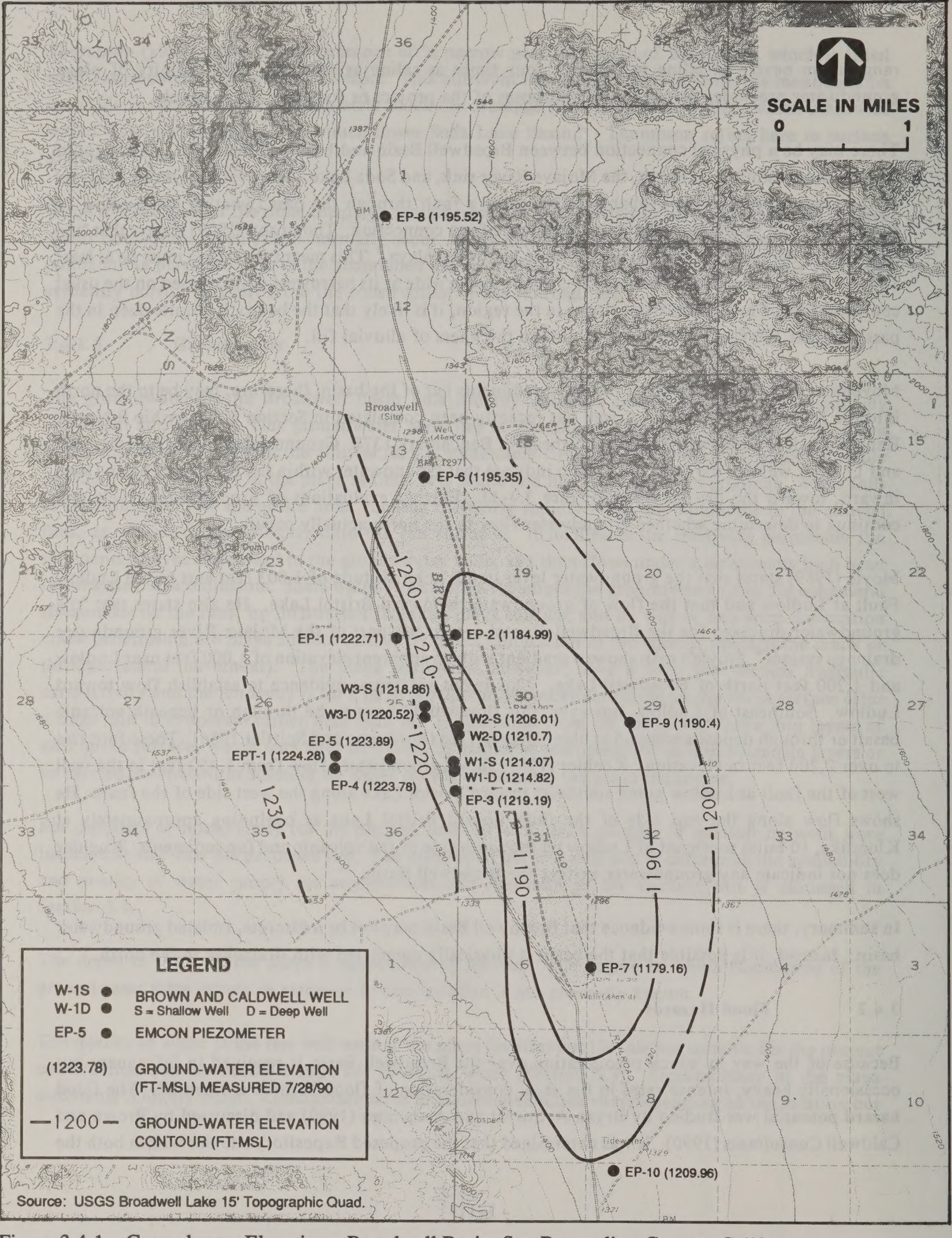
Movement of groundwater from the playa sediments out of the basin, therefore, may be to the north into the Mojave River Basin. A well has recently been completed in Section 1, Township 9 North, Range 7 East, in Broadwell Pass just northeast of Benchmark 1376. Groundwater levels from this well and 17 other wells in the Broadwell Basin indicate that groundwater within the Broadwell Basin flows inward, toward the dry lake bed (Figure 3.4-1). Further evaluations of groundwater levels will continue to determine whether groundwater flow to the north actually occurs.

Moyle (1989) states that the groundwater level stands at an altitude of 1,003 feet east of the Ludlow Fault at Ludlow and that the flow of groundwater is toward Bristol Lake. He also states that "the groundwater drainage for the Broadwell-Bristol area is not part of the Mojave River groundwater drainage system." Moyle's map shows a gradient with an apparent elevation of 1,000 feet near Ludlow and 1,200 feet north of Broadwell Lake. This is not sufficient evidence to establish flow toward Ludlow. Southeast of Ludlow, however, this flow would have to be through or beneath volcanic basalt or through deposits mapped as older alluvial fans (Bordugno and Spittler 1986). These fans rise to over 2,200 feet in elevation. Koehler (1983) shows groundwater flow from 1,450 feet in the well west of the fault at Ludlow going southeast toward Bristol Lake along the west side of the fault. He shows flow along the east side of the fault toward Bristol Lake as beginning approximately at Klondike, 10 miles southeast of Ludlow on the south side of the volcanic and fan sediments. Koehler does not indicate any groundwater exiting the Broadwell Basin.

In summary, there is some evidence that Broadwell Basin may not be a discrete, isolated groundwater basin. Instead, it is possible that the basin is physically connected with drainages to the north.

3.4.2 Flood Hazards

Because of the way in which precipitation over the Broadwell Basin is received in infrequent but occasionally heavy, intense rains in the area, consideration of flood hazards is essential. The flood hazard potential was studied by Bryan A. Stirrat and Associates (1990) and discussed by Brown and Caldwell Consultants (1990). It was determined that the proposed Repository site lies within both the



Source: USGS Broadwell Lake 15' Topographic Quad.

Figure 3.4-1 Groundwater Elevations, Broadwell Basin, San Bernardino County, California

calculated 100-year floodwater and the 24-hour probable maximum precipitation (PMP) boundaries. The total runoff volumes within the drainage basin resulting from the 24-hour, 100-year storm and the PMP are 36,271 acre-feet and 93,732 acre-feet, respectively. Figure 3.4-2 shows the floodwater boundaries for these two rainfalls events. The approximate elevations of the 100-year and PMP flood events are 1,307 feet and 1,321 feet, respectively. The existing lake bed elevation is 1,296 feet at a point close to the proposed Repository. The depth of standing water after a 100-year storm is estimated at about 11 feet over the lake bed.

3.5 NOISE

3.5.1 Definitions

Noise can be characterized as unwanted, unpleasant sound. It can cause hearing losses, interfere with speech communication, disturb sleep, and interfere with the performance of complex tasks. Noise may be either intermittent or continuous, steady or impulsive. It can result from a broad range of sources and frequencies blending together or from one specific sound. The human response to noise is diverse and varies with the type of noise, time of day, and sensitivity of the receptor.

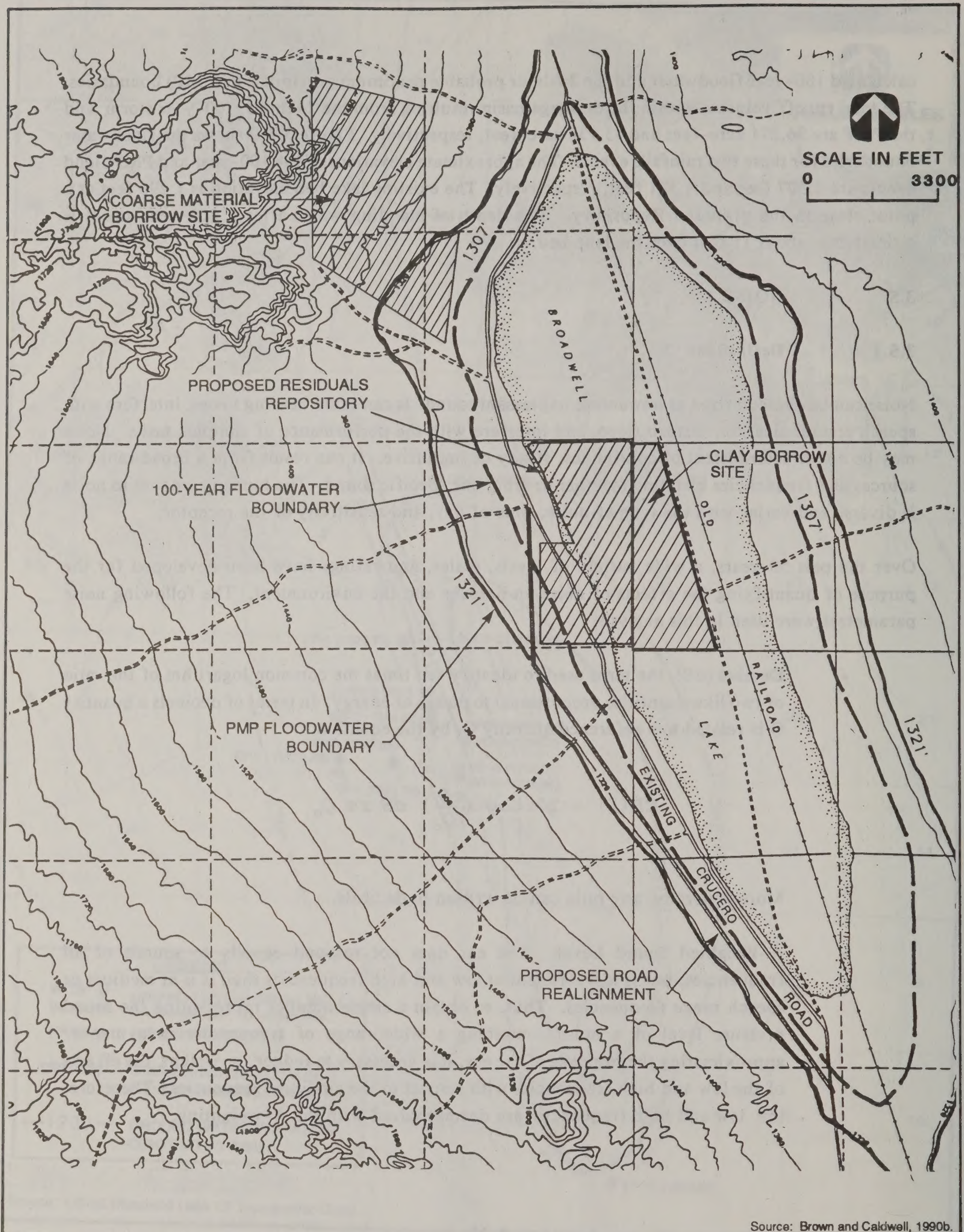
Over the past 50 years, a wide variety of levels, scales, and ratings have been developed for the purpose of quantifying the effects of noise on humans and the environment. The following noise parameters were used in this analysis:

- Decibel (dB), the term used to identify ten times the common logarithm of the ratio of two like quantities proportional to power or energy. In terms of decibels a quantity Q is related to a reference quantity Q_o by the equation:

  $$dB(Q) = 10 \; Log \left(\frac{Q}{Q_o}\right) \; dB \; re \; Q_o$$

  More generally, any ratio can be written in decibels.

- A-Weighted Sound Level: The ear does not respond equally to sounds of all frequencies, but is less efficient at low and high frequencies than it is at medium or speech range frequencies. Thus, to obtain a single number representing the sound pressure level of a noise containing a wide range of frequencies in a manner approximating the response of the ear, it is necessary to reduce, or weight, the effects of the low and high frequencies with respect to the medium frequencies. Therefore, the low and high frequencies are deemphasized with the A-weighting.



Source: Brown and Caldwell, 1990b.

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Figure 3.4-2 Floodwater Boundaries Around Broadwell Dry Lake, San Bernardino County, California

The A-scale sound level is a quantity, in dB, read from a standard sound-level meter with A-weighting circuitry. The A-scale decibels are expressed as dBA.

- Equivalent Sound Level (L_{eq}): L_{eq} is the level of a constant sound which, in a given situation and time period, has the same sound energy as does a time-varying sound. The level is generally "A" weighted prior to the averaging process and is normally defined over a relatively long time period (e.g., 1, 8, 12 or 24 hours). The time interval over which the measurement is taken should always be specified.

- Community Noise Equivalent Level (CNEL): CNEL is a measure of the noise environment over a 24-hour annual average day. CNEL is the 24-hour A-weighted sound level with a 5 dB penalty added to the evening (7 p.m. to 10 p.m.) noise levels and a 10 dB penalty added to the nighttime (10 p.m. to 7 a.m.) levels. The 5 and 10 dB penalties are applied to account for increased noise sensitivity during the evening and nighttime hours. The CNEL is not measured but computed. The State of California uses the CNEL noise index to relate community noise exposure to compatibility criteria. Typically, minor roadways do not generate sufficient noise to create a CNEL noise level of 65 dB off the roadway, while major arterials and freeways can create 65 dB levels that extend hundreds of feet into adjacent properties. CNEL values are specified by state noise insulation standards for new multiple family dwellings. Additionally, CNEL is the noise metric currently specified in state aeronautics code for evaluation of the noise impact of airplanes. Local compliance with the standards requires that community noise be specified in terms of CNEL.

- Day-Night Equivalent Sound Level (L_{dn}): L_{dn} is a measure of the noise environment over a 24-hour annual average busy day. L_{dn} is the 24-hour A-weighted equivalent sound level, with a 10 dB weighting penalty applied to nighttime (10 p.m. to 7 a.m.). This penalty is added to account for the fact that noise at night, when people are trying to sleep, is judged more annoying than the same noise during the daytime. The Environmental Protection Agency (EPA) has adopted L_{dn} as the rating method used to describe community noise. Usually CNEL and L_{dn} values will not differ by more than 1 or 2 dB.

3.5.2 Protective Noise Levels

The subjective effects of noise on humans represent a combination of physiological and behavioral impacts. By nature, subjective effects are most difficult to describe because different people react differently to particular noises. For example, a jet airplane flying overhead may disrupt a conversation between two people and cause momentary hearing loss. One person might term this occurrence as extremely annoying, whereas another person may find it only a mild nuisance. Community reaction surveys have found that prolonged L_{dn} noise levels approaching or above 80 dB generally disturb a community to the point of vigorous community action directed toward reducing or eliminating the noise source.

The EPA has identified a range of yearly day-night sound levels sufficient to protect public health and welfare from the effects of environmental noise (Environmental Protection Agency 1974). Outdoor yearly levels on the L_{dn} scale are sufficient to protect public health and welfare if they do not exceed 55 dB in sensitive areas (residences, schools, and hospitals). Inside buildings, yearly levels on the L_{dn} scale are sufficient to protect public health and welfare if they do not exceed 45 dB. Maintaining an L_{dn} noise level of 55 dB outdoors should ensure adequate protection for indoor living. Because these protective levels were derived without concern for technical or economic feasibility, and contain a margin of safety to ensure their protective value, EPA has indicated that they should not be viewed as standards, criteria, regulations, or goals. Rather, they should be viewed as levels below which there is no reason to suspect that the general population will be at risk from any of the identified effects of noise.

The State of California has adopted noise standards in areas not preempted by federal regulations (California Code of Regulations 1986). The purpose of the California Sound Transmission Control Standards is to establish minimum noise performance standards to protect persons within new hotels, motels, apartment houses, and dwellings other than detached single-family dwellings. The standards specify that interior noise levels, with windows closed and which are attributable to exterior sources, shall not exceed an annual CNEL noise level of 45 dB in any habitable room. Residential buildings or structures within an exterior noise environment of CNEL levels of 60 dB, where noise levels are caused by airport, vehicular, or industrial noise sources, are required to have acoustical analyses prepared indicating that the proposed buildings have been designed to limit background interior noise to the allowable CNEL noise level of 45 dB. The California Department of Housing and Community Development has established mandatory noise guidelines for multiple-family residential construction. New multiple-family units cannot be exposed to outdoor ambient noise levels in excess of 65 dB (CNEL or L_{dn}), and sufficient insulation must be provided to reduce interior ambient levels to 45 dB. Business and professional land uses are acceptable in areas of L_{dn} noise levels of 65 dB or less and are normally acceptable in areas exposed to L_{dn} levels of 65 to 75 dB. In industrial areas, noise levels up to 75 dB are normally acceptable while conditionally acceptable noise levels range from 70 to 80 dB.

The San Bernardino County Noise Element establishes land use compatibility criteria L_{dn} noise levels of 45 and 60 dB for interior and exterior noise levels of residential developments, respectively. An exterior L_{dn} noise level of up to 65 dB is allowed provided exterior noise levels have been substantially mitigated through a reasonable application of the best available noise reduction technology, and interior noise exposure does not exceed a L_{dn} noise level of 45 dB. These criteria apply to mobile noise sources such as traffic on public roadways, railroads, and aircraft.

The San Bernardino County Noise Element also states that when industrial, commercial, or other land uses, including locally regulated noise sources, are proposed for areas containing noise-sensitive land uses, noise levels generated by the project shall not exceed the standards presented in Table 3.5-1, within outdoor activity areas. If outdoor activity areas have not yet been determined, noise levels shall not exceed the performance standards in Table 3.5-1 at the boundary of areas planned or zoned for residential or other noise-sensitive land uses.

Because there are currently no existing or proposed sensitive developments in the vicinity of the project site, these standards would be applicable to the nearest existing residences, in the community of Ludlow. If future noise sensitive development is proposed in the vicinity of the Broadwell Basin Residuals Repository, the performance standards of Table 3.5-1 would be applicable.

3.5.3 Existing Noise Environment

To quantify existing ambient noise levels in the project vicinity, continuous noise measurements were conducted by Brown-Buntin Associates on January 16 through 18, 1990. A Larson Davis Laboratories (LDL) model 700B integrating sound level meter was used for the measurements. The meter was calibrated before use with an LDL acoustical calibrator to ensure the accuracy of the measurements. The equipment used meets all pertinent specifications of the American National Standards Institute (ANSI) for precision sound level measurement systems.

The most significant noise sources affecting the project site were observed to be military aircraft operations and wind. In general, existing noise levels at the project site were low, with average noise levels typically in the range of 20 to 50 dBA in the absence of aircraft overflights. During aircraft overflights, average noise levels ranged from 40 to 60 dBA.

Table 3.5-1

Hourly Noise Level Performance Standards
Stationary and Other Locally Regulated Sources*

	7 a.m. - 10 p.m.		10 p.m. - 7 a.m.	
Land Use Category	L_{eq}	L_{max}	L_{eq}	L_{max}
Residential or other noise-sensitive receivers	55 dBA	75 dBA	45 dBA	65 dBA

Note: *Some noise sources are preempted from local noise control. Preempted sources include vehicles operated on public roadways, railroad line operations, and aircraft in flight.

Figure 3.5-1 shows typical noise sources and their corresponding decibel levels. Comparing the ambient noise measurement results with Figure 3.5-1 shows that the measured average noise levels were in the faint to moderate ranges at the project site.

To describe existing noise levels caused by traffic, Brown-Buntin Associates employed the Federal Highway Administration (FHWA) Highway Traffic Noise Prediction Model (FHWA RD-77-108). Traffic data were obtained from California Department of Transportation (Caltrans) counts and project-related traffic studies conducted by BSI Consultants to determine existing traffic volumes, truck mix, day/night distribution, and traffic speed for Interstate 40 and the access road (Brown-Buntin Associates 1990).

The FHWA model results indicate that existing Interstate 40 L_{dn} noise levels are approximately 73 dB at a distance of 100 feet from the roadway centerline. Noise sensitive land uses within approximately 700 feet of Interstate 40 are exposed to L_{dn} noise levels exceeding 60 dB.

Because existing traffic volumes for the access road are very low, the traffic noise level from access road traffic is insignificant.

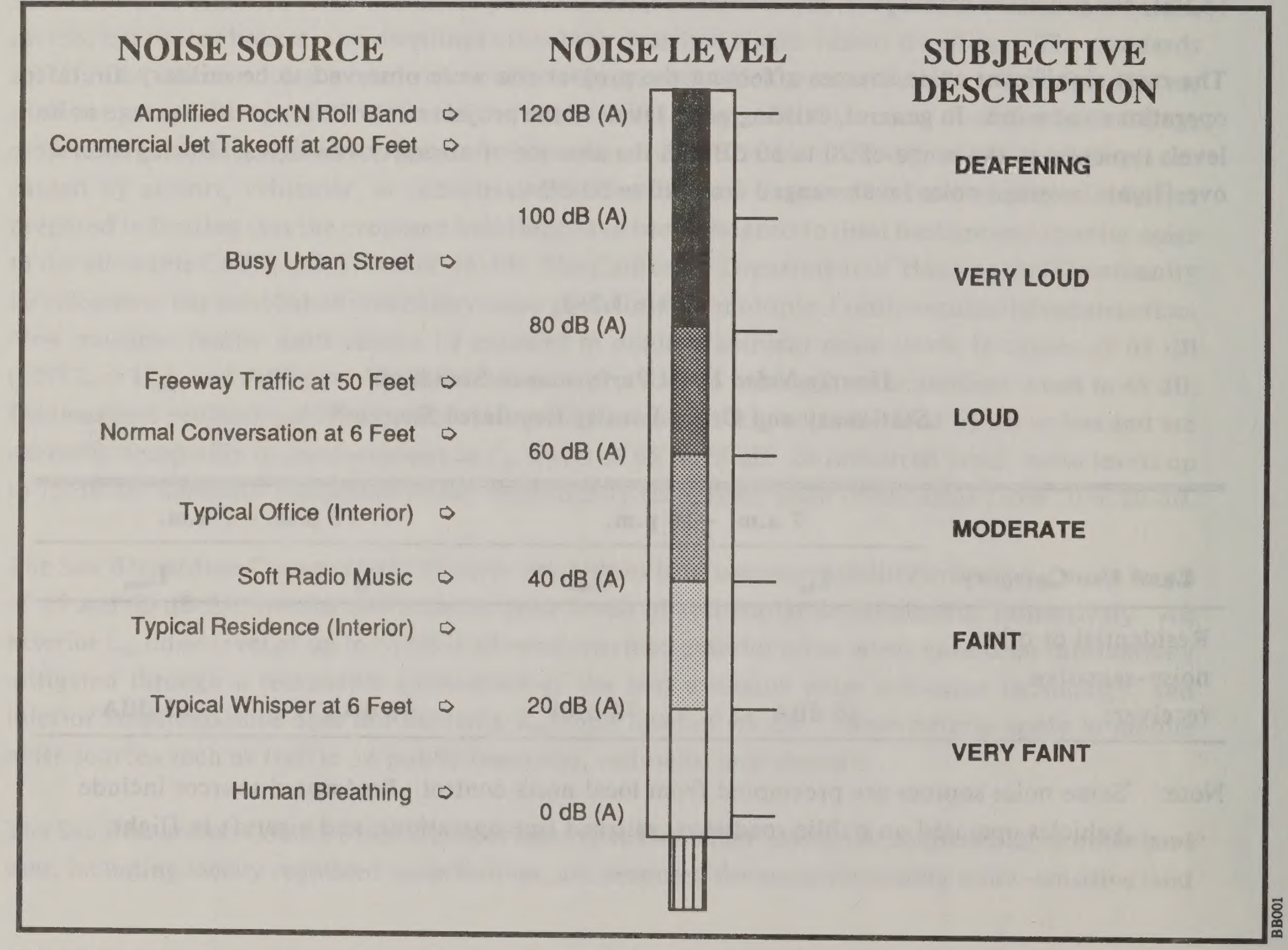


Figure 3.5-1 Examples of Noise Levels

3.6 BIOLOGICAL RESOURCES

Tierra Madre Consultants, between 1989 and 1991, prepared five different documents to characterize the biological resources of the proposed project area. These studies, based on nine different surveys and biological assessments, are the primary source of information for the analysis presented in the following sections.

3.6.1 Vegetation

Residual Repository Facility and Clay Borrow Area. Two plant communities are present in the proposed project area: the creosote bush scrub and the saltbush scrub communities, both of which are common in the Mojave Desert (Tierra Madre Consultants 1990a). In addition, a desert wash association in the major drainages provides some floral and structural diversity. The alkali sink on the lake bed could be termed a separate community, but the lake bed and edge lack the distinct assemblage of species characteristic of the alkali sink community as described by Munz (1974) or Holland (1986).

The creosote bush scrub consists of widely spaced shrubs dominated by creosote bush (*Larrea tridentata*) and burrobush (*Ambrosia dumosa*). Widely scattered cacti are interspersed. Cacti increase near the edge of the Cady Mountains; for example, the cottontop cactus (*Echinocactus polycephalus*) was found on the rocky hillsides at the coarse material borrow area.

The diversity of perennial plants is very low in the creosote bush scrub near Broadwell Lake. No annual plants (spring wildflowers) were visible, although they can constitute 90 percent of the flora of some desert communities (Barbour and Major 1988). The winter and spring rainfall for 1989 was too low to germinate spring annuals in this part of the Mojave Desert.

The larger washes running through the Broadwell Lake Valley contained smoke trees (*Psorothamnus spinosus*), cheesebush (*Hymenoclea salsola*), catclaw (*Acacia greggii*), and other species adapted to capturing the brief rainfall and runoff. Vegetation of the washes was taller and denser than the surrounding creosote bush scrub, and provided a better habitat for wildlife, with greater shade and cover.

The saltbush scrub community occupies a fringe of saline soils surrounding Broadwell Lake. A monotonous stand of allscale (*Atriplex polycarpa*) dominates this community, which consists of closely spaced shrubs of lower stature than the creosote bush scrub.

Crucero Road Alignment. In general, the plant community found along the entire length of Crucero Road and the two alternate access roads, and throughout the basin, is Mojave creosote bush scrub as described by Munz (1974) and Holland (1986). The community is interspersed with saltbush scrub along the western portions of the playa and with a desert wash association to the south.

Perennial plants commonly found along Crucero Road and the alternate access roads include creosote bush, burrobush, matchweed (*Gutierrezia* sp.), cheesebush, rayless encelia (*Encelia frutescens*), Mormon tea (*Ephedra californica*), and linear goldenbush (*Haplopappus linearifolia*). Several cactus species were also found, including silver cholla (*Opuntia echinocarpa*), beavertail cactus (*Opuntia basilaris* var. *basilaris*), and pencil cholla (*Opuntia ramosissima).* No sensitive plant species were observed during any of the floral surveys.

Annual plants that were found during the floral surveys include Schismus grass (*Schismus barbatus*), desert trumpet (*Eriogonum inflatum)*, jimsonweed (*Datura wrightii*), coldenia (*Tiquilia plicata)*, buckwheat (*Eriogonum gracile*), tumble mustard (*Sisymbrium altissimum*), sandmat (*Euphorbia albimarginata*), red primrose (*Camissonia boothii*), desert milk aster (*Stephanomeria pauciflora*), fiddleneck (*Amsinckia tesselata*), and Russian thistle (*Salsola iberica*).

Several broad desert washes cross Crucero Road to the south, and one of these washes is found just east of the two western alternate access roads. In places, the washes are 20 feet wide and sandy with few plants growing near the center. Typical creosote bush scrub is found adjacent to the washes. Perennial plants only found within or near the washes include smoke trees (*Dalea spinosa*), tamarisk (*Tamarix* sp.), small-leaved baccharis (*Baccharis brachyphylla*), catclaw, and sandpaper plant (*Petalonyx thruberi*). The only coldenia and jimsonweed observed were within the banks of one of the washes.

Coarse Material Borrow Area. A single plant community found throughout the proposed coarse borrow site is creosote bush scrub. The community is dominated by creosote bush, although other perennial shrubs, such as linear goldenbush (*Haplopappus linearifolius*), burrobush, allscale, cheesebush, needlegrass (*Stipa* sp.), galleta (*Hilaria rigida*), and bush encelia (*Encelia virginensis*), are common. Pencil cholla and beavertail cactus are the common cactus species, although silver cholla, cottontop cactus, and Yagui mamillaria (*Mammilliaria tetracistra*) are also present. Creosote bush is relatively dense near the southwest corner of the site, whereas some of the rock benches are devoid of all vegetation.

Many sandy washes occur throughout the site. In addition to those plants previously listed, several perennial plants were found only along the washes or uncommonly elsewhere. These include smoke tree, odora, catclaw, sandpaper plant, sweetbush (*Bebbia juncea*), and small-leaved baccharis. It rained during the second week of August 1990, two weeks prior to surveys, and more annual plants were present than had been found in April. Annual plants were especially common in and along the various small washes. Some of the dominant annual plants include rattlesnake weed (*Euphorbia albomarginata*), chinch weed (*Pectis papposa*), six-weeks grama (*Bouteloua barbata*), and needle grama (*B. aristidoides*).

The condition of floral resources of the site is relatively good. All of the 38 plants found are native to California, indicating minimal degradation of floral resources. Plant densities are typical, and range from approximately 40 percent ground cover (near the southwest corner) to zero percent ground cover (on the rocky terraces to the west).

3.6.2 Wetlands

During field examination of the Broadwell dry lake bed in September 1990, one week following a storm, standing water was dectected in a small borrow site adjacent to the railroad berm. Shore birds were observed on the water. Except for one tamarisk tree, an introduced species, on the edge of the borrow site, there was a conspicuous absence of hydrophytic vegetation. This playa lake may be considered a "highly variable seasonal wetland" which may have "indicators of all three wetland criteria during the wetter portions of the growing season, but normally lack indicators of wetland hydrology and/or hydrophytic vegetation during the drier portion of the growing season" (Federal Interagency Committee on Wetland Delineation 1989).

The U.S. Army Corps of Engineers has determined that the playas and dry lakes are jurisdictional wetlands because they serve a water recharge function and can have ephemeral biota (U.S. Army Corps of Engineers 1991). Excavation of materials from the Broadwell dry lake would require a Section 404 permit.

3.6.3 Wildlife

Residual Repository Facility and Clay Borrow Area. Native habitats within the area encompassing the 316-acre Repository site and 227-acre adjacent clay borrow area (west of the railroad bed alignment) consist predominantly of saltbush scrub community including remnants of alkali sink vegetation. Creosote bush scrub habitat occurs in the vicinity of the proposed entrance and treatment and support facilities site. The sparse vegetation and xeric conditions provide habitat for only the hardiest of wildlife species. Although some snakes are expected to venture into the area of the Repository site, none were observed. Four species of lizards were observed, including zebra-tailed lizard (*Callisaurus draconoides*), western whiptail (*Cnemidophorus tigris*), desert iguana (*Dipsosaurus dorsalis*), and desert horned lizard (*Phrynosoma platyrhinos*). The zebra-tailed lizard comprised 74 percent of the lizards observed. No desert tortoises (*Xerobates agassizi*) or their signs were detected at the Repository site. The potential occurrence of the desert tortoise is discussed in Section 3.6.4.

Small mammal trapping studies indicate the Merriam kangaroo rat (*Dipodomys merriami*) and desert kangaroo rat (*Dipodomys deserti*) to be common inhabitants of this area. Lesser numbers of round-tailed ground squirrel (*Citellus tereticaudus*), antelope ground squirrel (*Ammospermophilus leucurus*), deer mouse (*Peromyscus maniculatus*), and desert pocket mouse (*Perognathus penicillatus*) were also detected. Predator scent stations indicate visitation by the desert kit fox (*Vulpes macrotis*). Scent stations placed throughout the vicinity of Broadwell Lake indicate the kit fox to be the most abundant mammalian predator in the area. Additional mammals detected within the vicinity include black-tailed jackrabbit (*Lepus californicus*), Audubon's cottontail (*Sylvilagus audubonii*), and grey fox (*Urocyon cineroargenteus*). Although undetected within this area, coyote (*Canis latrans*) are expected.

Bats were not censused specifically, although several species might forage for nocturnal insects in the Broadwell Lake region. Less than five individuals were observed at the north end of the lake. Other than the Old Dominion Mine vicinity, no trees, mine tunnels, or caves are known to be present on the project site. Therefore, crucial roost and breeding habitat for certain species of bats is absent. The site is within the range of the California leaf-nosed bat (*Macrotus californicus*) and the pale big-eared bat (*Plecotus townsendii pallescens*), which are considered Species of Special Concern by the California Department of Fish and Game (CDFG) (Williams 1986). Nursing colonies of these species have been reported from Imperial County and the Colorado River areas of Riverside and San Bernardino counties, respectively, mainly in mine adits. Five additional sensitive bat species have been identified by the U.S. Fish and Wildlife Service (USFWS) which may occur in the east Mojave Desert region (see Section 3.6.4, Table 3.6-1).

Virtually no resident bird species inhabit the Repository site. However, during spring surveys, several species of migratory songbirds were observed including black-headed grosbeak (*Pheucticus melanocephalus*), Wilson's warbler (*Wilsonia pusilla*), MacGillivray's warbler (*Oporornis tolmiei*), yellow-rumped warbler (*Dendroica coronata*), hermit warbler (*D. occidentalis*), and barn swallow (*Hirundo rustica*). After seasonal rains, numerous waterbirds are expected in the vicinity of the clay borrow area and Repository site. An abundance of American avocet (*Recurvirostra americana*) and northern shoveler (*Anas clypeata*) were observed at the north end of the lake after rain storms in late August 1990. Microorganisms dormant during most of the year flourish after seasonal rains, thereby providing a rich food source for bird species normally unexpected in a desert environment.

Crucero Road Alignment. A monotypic stand of open creosote bush scrub habitat occurs along the Crucero Road alignment. Creosote bushes are widely spaced and foliage height seldom exceeds 4 feet. Wooden utility poles occur along the road alignment, and metal transmission towers bisect Crucero Road near Interstate 40. With the exception of waterbirds associated with the water resource within the Broadwell Lake playa, all wildlife detected and discussed previously were detected or are expected along the Crucero Road alignment.

Rodent densities varied considerably along the Crucero Road alignment. The greatest variability occurred with the Merriam kangaroo rat, which had a low of one individual trapped near the junction of the transmission line and the road alignment, to an abundance of 58 individuals approximately one-half mile northwest of the Repository site. Predator scent stations revealed the presence of a single kit fox in the vicinity of the Repository site and at all five scent stations placed between Interstate 40 and the southern end of Broadwell Lake. Coyote and grey fox were also observed or detected by sign along the road alignment and zone of influence.

Few resident bird species inhabit the open creosote bush scrub habitat. However, numerous desert washes crossing the road alignment, particularly the Argos Wash adjacent to the Southern California Edison transmission alignment, provide greater shrub diversity and increased foliage height diversity, thereby providing a higher-quality habitat than the surrounding desert. The increased moisture along these washes provides suitable growing conditions for larger shrub species including smoketree and mesquite. These shrubs provide critical nesting sites for birds, which are unavailable in the surrounding creosote scrub community. Many migrant bird species utilize the desert wash habitats for cover and foraging. Additionally, the low profile and increased shrub cover associated with washes provide movement corridors for all wildlife. LeConte's thrashers (*Toxostoma lecontei*) were observed along the Crucero Road alignment in the vicinity of Argos Wash and approximately one and a half miles north of Argos Wash. Two prairie falcons (*Falco mexicanus*) were observed during the May-June 1989 survey near the southern end of Broadwell Lake. Pellets from a burrowing owl (*Athene cunicularia*) were located approximately 300 feet west of Crucero Road, about midway between Interstate 40 and the southern end of Broadwell Lake.

Coarse Material Borrow Area. The 363-acre coarse material borrow site northwest of the Repository site occurs on the southeast slopes of the Cady Mountains, and descends to the east from approximately 1,350 feet to 1,200 feet in elevation. Erosion has formed dense, rocky terraces above sandy washes. Several rock outcrops and small hills occur on the western portions of the site. Similar to most other areas on the project site, creosote bush scrub habitat comprises the majority of vegetative cover. The most evident physical and biological differences unique to the borrow area include increased slope angle, presence of rocky areas, increase in desert washes, and higher density of cacti species. Overall, biological resources on the project site are best within the borrow area. The abundance of rock outcrops and diversity of physical attributes on the borrow area, and within the adjacent Cady Mountains, provides shelter from the midday sun and denning areas for numerous mammalian species. Additionally, the abundance of desert washes flowing off the Cady Mountains provides a higher-quality habitat than the surrounding creosote bush scrub habitat. Most wildlife detected elsewhere within the Broadwell Basin were observed or are expected on the borrow site. Black-tailed jackrabbits and kangaroo rats were the most commonly detected mammals. Additional wildlife encountered on the borrow site that were undetected elsewhere include bobcat (*Lynx rufus*), desert woodrat (*Neotoma lepida*), little pocket mouse (*Perognathus longimembris*), sidewinder (*Crotalus cerastes*), side-blotched lizard (*Uta stansburiana*), and desert collared lizard (*Crotaphytus insularis*). Three LeConte's thrasher nests were also found. No live desert tortoises or other desert tortoise signs (e.g., scats, tracks, or carcasses) were found. Because bighorn sheep and wild burros are known to inhabit the Cady Mountains, these species may periodically traverse the upper reaches of the proposed borrow area.

3.6.4 Threatened and Endangered Species and Species of Special Concern

A computerized search of the California Natural Diversity Data Base (CNDDB), previous reports from the area, and other materials reviewed, indicate that one sensitive plant and three sensitive animal species have been reported to occur in the vicinity and therefore may also occur at the proposed Repository site. In addition to the reported species, two others were observed during fieldwork. Sensitive species and communities are so-called because their populations are declining, they are especially vulnerable to habitat change, or because they have restricted distributions and are therefore uncommon. In this report, sensitive species include all species listed as threatened or endangered by the state and federal government as well as those species described as "candidate species, California species of special concern, fully protected," or designated by the California Native Plant Society as rare or uncommon within the state. Definitions of these terms are found in Table 3.6-1. For a summary of those sensitive species and communities potentially occurring and known to be present at Broadwell Dry Lake, see Table 3.6-1. The sensitive species either reported from the proposed borrow area or found during previous surveys include crucifixion thorn, desert tortoise, burrowing owl, LeConte's thrasher, prairie falcon, and desert kit fox. The project site is also within the distribution range of seven sensitive bat species. Although some of these bats may forage within the vicinity of the project area, no suitable roost or breeding sites were identified on the site or are expected to be affected by project implementation. Two areas of special biological importance have been designated by the CDFG in the project vicinity: the Cady Mountains and Granite Mountains. The Cady Mountains are identified as a refuge for Nelson's bighorn sheep, which is classified as a sensitive species by the BLM. The status of each sensitive species is described in Table 3.6-1.

Table 3.6-1

Sensitive Species Potentially Occurring in the Proposed Project Area at the Broadwell Dry Lake Site

Sensitive Species and Associated Habitat	Status Designation*	Occurrence Probability**	Number of Sightings
Plant Species			
Castela emoryi Crucifixion thorn Desert plain	1) ND 2) ND 3) List 2 R-3 E-1 D-1	Absent	0
Animal Species			
Xerobates agassizi Desert tortoise Creosote bush scrub; saltbush scrub	1) T 1) BLM 2) CT	Absent	0
Athene cunicularia Burrowing owl Grasslands and open terrain	1) ND 2) CSC	Occurs	0
Buteo regalis Ferruginous hawk Open terrain	1) C2	Moderate	0
Falco mexicanus Prairie falcon Grasslands, hilly areas, mountains	1) ND 2) CSC	Occurs	2
Toxostoma lecontei LeConte's thrasher Sparse desert scrub near washes; nests in silver cholla	1) ND 2) CSC	Occurs	3 nests
Choeronycteris mexicana Mexican long-tongued bat	1) C2	Low	0
Euderma maculatum Spotted bat	1) C2 2) CSC	Low	0
Eumops perotis californicus California mastiff bat	1) C2 2) CSC	Low	0
Macrotus californicus California leaf-nosed bat	1) C2 2) CSC	Moderate	0

Sensitive Species and Associated Habitat	Status Designation*	Occurrence Probability**	Number of Sightings
Myotis lucifugus occultus Occult little brown bat	1) C2 2) CSC	Low	0
Myotis velifer brevis Southwestern cave myotis	1) C2 2) CSC	Low	0
Plecotus townsendii pallescens Pale big-eared bat	1) ND 2) CSC	High	0
Vulpes macrotis arsipus Desert kit fox	1) ND 2) SA	Occurs	Frequent
Ovis Canadensis Nelson's bighorn sheep	1) BLM	Low	0

***Status designations:**

1) Federal designations:
T = Federally listed, threatened.
C2 = Category 2 candidate species for federal listing.
ND = Not designated.
BLM = BLM Sensitive Species.

2) State designations:
CT = State listed, threatened (previously listed as rare).
CSC = CDFG Species of Special Concern.
SA = CDFG "Special Animals" list.
ND = Not designated.

3) California Native Plant Society (CNPS):
List 2 - Plants rare or endangered in California, but more common elsewhere.

R-E-D Code:
R (Rarity)
1 - Rare, but found in sufficient numbers and distributed widely enough that the potential for extinction or extirpation is low at this time.
2 - Occurrence confined to several populations or one extended population.
3 - Occurrence limited to one or a few highly restricted populations, or present in such small numbers that it is seldom reported.

E (Endangerment)
1 - Not endangered.
2 - Endangered in a portion of its range.
3 - Endangered throughout its range.

Table 3.6-1, Page 3 of 6

D (Distribution)
1 - More or less widespread outside California.
2 - Rare outside California.
3 - Endemic to California (i.e., does not occur outside California).

****Definitions of Occurrence Probability:**

High: Observed on similar habitat in the surrounding region, or habitat on the site is a type often utilized by the species and the site is within the known range of the species.

Moderate: Reported sightings in the surrounding region, habitat on the site is a type occasionally utilized by the species; or the site is within the known range of the species and habitat on the site is a type occasionally utilized by the species.

Low: Site is within the known range of the species but habitat on the site is rarely used by the species.

Occurs: Observed or detected on the site by Tierra Madre Consultants staff during this or other studies performed in 1989 and 1990.

Absent: A focused study for this species failed to reveal its presence, or the habitat type used by the species is not present.

Information sources of status descriptions are derived from the California Natural Diversity Data Base and CNPS.

Explanations of Occurrence Probabilities:

Crucifixion thorn is a much branched, very thorny shrub, five to nine feet tall, with spinose or spur-like branchlets and green, yellowish, or brownish bark. Leaves are reduced to small alternate deciduous scales. Crucifixion thorn grows in a few localities in the desert regions of southeastern California. The BLM has designated two regions near State Highway 95 in the Chemehuevi Valley south of Needles as Unusual Plant Assemblages because of the occurrence of crucifixion thorn. This plant has been collected from Ludlow, Goffs, and Daggett on the Mojave Desert. The data base record indicates its occurrence in Lavic Lake. Crucifixion thorn is large enough that, if present, it would have been detected during the thorough surveys. It is therefore presumed to be absent.

The **desert tortoise** occurs in canyon bottoms, on rocky hillsides, and especially in sandy and gravelly washes and flats. Creosote bush scrub is a preferred plant community as it provides herbs, grasses, and cacti needed for sustenance. Its abundance appears to be greatest near areas having surface water, such as along the Mojave River and at various desert oases. It requires areas with firm soil, allowing construction of burrows, which it may occupy up to 6 months out of the year. Burrows are typically found at the base of shrubs, and often in the banks of washes. Diurnal activity is greatest during the spring and early summer months, and to a lesser extent, during fall. During winter, tortoises retreat to burrows where they hibernate.

Desert tortoise was state listed as threatened in June 1989, and federally listed as threatened in April 1990. Studies by the BLM have shown densities of zero to 20 tortoises per square mile in the area of the project site. The site is found in USFWS-designated Class 3 habitat (BLM's Category 3 habitat), which aside from Class 0, where no tortoises are expected, is the least likely place to find tortoises.

Focused desert tortoise surveys were performed along Crucero Road and the two alternate access roads, at the entrance facilities and adjacent to the clay borrow site, and at the coarse borrow site. Surveys along Crucero Road, the two alternate access roads, and adjacent to the clay borrow site and the entrance facilities site did not find any evidence of resident tortoises. The only positive sign of desert tortoise observed during those surveys was a relatively old tortoise carcass adjacent to Interstate 40. No tortoise sign was found on the 363-acre coarse borrow site.

Ten inactive cover sites (i.e., burrows) that were found along Crucero Road indicate that tortoises historically, perhaps only a few years ago, may have occurred at low densities. Six of those cover sites were too deep to see the ends. In March 1991, resurvey was done with a fiber optics scope. No sign of tortoise residency was detected during this survey of four burrows and the reinvestigation of one other burrow. It was even considered doubtful that these were tortoise burrows; they may be kit fox digs or eroded kangaroo rat burrows. The preponderance of evidence indicates that tortoises, if they occur, only occur at very low densities.

The studies do indicate the probable presence of desert tortoise within the Broadwell Basin at very low population densities. Aside from the dry lake playa, the entire basin is ostensibly suitable desert tortoise habitat; i.e., has the appropriate vegetational and geological characteristics to support tortoises and has not been degraded by extensive human disturbance, such as brushing of vegetation or heavy off-road vehicle use.

Burrowing owls inhabit grasslands, uncultivated lands in agricultural areas, and other open areas. They may use abandoned burrows of ground squirrels, and if undisturbed, will use the same burrow year after year. This raptor is active both during the day and night, and feeds primarily on ground-dwelling mammals and large insects. Burrowing owls were once common and locally abundant throughout much of California, but a decline noticeable in the 1940s has continued through to the present time. The loss of suitable habitat as a result of agriculture and urbanization has contributed to its decline.

Burrowing owl burrows are distinctive because the area around the openings are littered with small bone fragments and regurgitated pellets. A single inactive burrow with pellets was found 300 feet west of Crucero Road during the April survey.

The **ferruginous hawk** has a strong preference for open terrain. In California, this hawk is primarily migratory, nesting only in the extreme northern portions of the state. In Southern California, ferruginous hawks are uncommon to fairly common winter visitors, and most commonly found in the vicinity of agricultural fields. Their food source consists almost entirely of rodents, with the black-tailed jackrabbit and ground squirrels making up a large percentage of their diet. Being a raptor of open terrain, and frequently in areas with few trees, this raptor is accustomed to spending a large amount of time on the ground. Pesticides and loss of native habitat are probably the greatest threat to this species.

No ferruginous hawks were observed in the Broadwell Basin during the field surveys; however, the open arid terrain on and surrounding the project site is suitable foraging habitat. Therefore, there is a moderate occurrence probability that this species may periodically utilize the site for foraging during migration and throughout the winter period.

Prairie falcons are found over much of the western United States. This species inhabits arid, open lands, and occasionally woodlands. Its nests are usually on high cliff faces in crevices of caves. The prairie falcon is a year-round resident in much of its range, descending to open lands during fall and winter months. This species feeds primarily on small birds but also on small mammals and reptiles. Threats to this species include pesticide contamination, robbing of aeries by falconers, shooting, human activities near nest sites, and habitat conversion by development activities.

Two prairie falcons were observed during the May and June 1989 surveys. As discussed in that report (Tierra Madre Consultants 1989), there is suitable nesting habitat in the Cady Mountains, but not on the site.

LeConte's thrashers inhabit areas with sparse desert scrub, especially those that contain small washes. It can be found throughout much of the Mojave and Colorado deserts, and an isolated population exists in southwestern San Joaquin Valley, near Taft and Maricopa. Its population densities are among the lowest of passerine (perching) birds, with estimated densities in optimum habitat of less than five birds per square mile. This low population density, along with their secretive habits, decreases the probability of their detection by observers. Only during breeding activities, when males sing from exposed perches (often the tops of shrubs), are they relatively easy to detect.

Five LeConte's thrashers were observed throughout the project area. A single nest was found within the borrow area northwest of the Repository site.

The **Mexican long-tongued bat** is a tropical bat which feeds primarily on fruits and the nectar of night-blooming plants and rarely occurs north of the Mexican border. This species is the only bat in California which is not an insect-eating bat. Although focused surveys were not conducted for bats, no suitable forage or roosting areas occur on the site, and the Broadwell Basin is north of the known range of this species; therefore, there is only an extremely remote possibility that this species could utilize the project site.

Spotted bats are generally associated with grasslands and foothill regions in the Sonoran and Transition life zones throughout the southern Sierran and Great Basin Regions. Little is known about the specific habitat requirements of this species, but probably requires secluded caves, crevices, or snags for roosting and breeding. Large placid pools, ponds, or lakes are required for drinking. There is only a low probability occurrence of this rare bat utilizing the project site, with any occurrence on the site likely to occur during periods when water occurs in the Broadwell Basin.

The **greater western mastiff-bat** occurs within arid or semi-arid regions. In Southern California, it occurs primarily in the San Joaquin Valley and coastal plain; infrequently extending into the dry desert regions. The generally unsuitable foraging habitat in the eastern Mojave Desert region and lack of areas for roosting and breeding sites within the Broadwell Basin indicates there is only a low probability occurrence for this species utilizing the project site.

The **California leaf-nosed bat** occurs throughout the dry arid regions of Southern California. It is found in the hottest desert regions, in the Lower Sonoran Life Zone, particularly within the Colorado Desert region along the Colorado River drainage. This arid bat frequently roosts in buildings and mine shafts. Because suitable foraging areas occur within the Broadwell Basin and suitable roosting areas may occur off the site in the surrounding hills, there is a moderate probability that this species could utilize the project site during foraging periods.

The **Occult little brown bat** occurs primarily in southeastern California, Arizona, and New Mexico. As indicated by the distribution range, this species is generally found in hot arid regions. In California, this species occurs primarily along the Colorado River drainage. Suitable foraging habitat often includes trees and open water, and less frequently, open sparsely vegetated areas. As no suitable roost or breeding sites occur on the project site or borrow sites, there is only a low probability of this species occurring in the Broadwell Basin.

The **Southwestern cave myotis** is a colonial bat which frequently requires large caves and mine shafts for roosting and breeding. This species is also quite nomadic, moving from place to place in search of rich food resources. In California, this species is primarily confined to the Colorado River drainage. Similar to the Occult little brown bat, because the Broadwell Basin is generally outside of the range for this species, or does not include suitable roost or foraging habitat, there is only a low probability of this species occurring on the site.

The **pale big-eared bat** is a colonial bat whose range extends throughout the western United States, occurring in numerous habitats. During non-breeding periods, this species frequently moves from cave to cave. Although no roost or maternity sites occur within the project area, this species may utilize the Broadwell Basin during foraging periods. Therefore, there is a high probability that this species may utilize the project site.

The **desert kit fox** is a small, primarily nocturnal fox that occurs throughout the deserts of North America. It is found in a wide variety of habitats including creosote bush scrub, shadscale scrub, alkali sink, and Joshua tree woodland. Like other canines it is chiefly a carnivore, occasionally utilizing some plant material for food. The kit fox plays an important role in controlling rodent populations. Population densities of kit foxes have been estimated at one pair per three and one-half square miles of desert, and territories can be extensive. Principal threats to this species are habitat loss, vehicle collisions, and indiscriminant predator control programs.

Habitat on the project site is excellent for kit foxes, and scats were found during the present study. Kit foxes were detected on six of the 16 scent stations established in the area.

For a discussion of **Nelson's bighorn sheep**, see Cady Mountains description below.

Areas of Special Biological Importance. Two areas of special biological importance have been identified by the CDFG as occurring in the vicinity of the Broadwell Basin. These are the Cady Mountains, located six miles west of the lake, and the Granite Mountains, located 18 miles east. These areas, and sensitive biological resources inherent to them, are discussed below.

The *Cady Mountains* are identified by the CDFG as a refuge for Nelson's bighorn sheep (*Ovis canadensis*). Dr. John Wehausen, a bighorn sheep researcher from the University of California, Riverside, indicates that the reintroduction of bighorn to the Bristol Mountains, located one mile northeast of Broadwell Dry Lake, is a high priority of the CDFG (Mitchell 1989). If this reintroduction occurs, it is possible that a bighorn travel corridor could become established between the Cady Mountains and the Bristol Mountains. Given the geographical location of these two mountain ranges in relation to the dry lake playa, it is likely that such a corridor would occur north of the lake and the proposed facilities.

The *Granite Mountains*, located 18 miles to the east of Broadwell Basin, have also been identified as a refuge for Nelson's bighorn sheep. The University of California Granite Mountains Ecological Reserve is located in the Granites. The CDFG has designated the Granite Mountains as a wildlife water source. This water source is utilized by various big game, upland game, and nongame species. This area is especially important for bighorn sheep, desert mule deer, and non-native wild burros. Both the Cady Mountains and Granite Mountains are the subject of habitat management plans set forth in the California Desert Conservation Plan of 1980.

3.7 CULTURAL AND PALEONTOLOGICAL RESOURCES

Five cultural resources surveys and three paleontological surveys were conducted by Hatheway and McKenna, McKenna et al., and Robert Reynolds of the San Bernardino County Museum for all proposed project areas in 1990. Reports from these surveys were the primary source of information for the analysis presented here.

3.7.1 Prehistoric Resources

A variety of prehistoric cultural resources have been recorded in the eastern Mojave Desert including camps, cave sites (occupational and magico-religious), lithic scatters, trails, rock alignments, and isolated artifacts. The time range represented by these resources extends back at least 12,000 years, and, in the view of some investigators, perhaps even earlier. A commonly used cultural sequence for the region is that of Warren and Crabtree (1986). The defined periods, marked by changes in distinctive artifact types, especially projectile points and pottery, are Lake Mojave (12,000-7,000 years before present [BP]), Pinto (7,000 to 4,000 BP), Gypsum (4,000 to 1,500 BP), Saratoga Springs (1500 to 800 BP), and Shoshonean (800 BP to Contact). Most identified sites have been limited to the surface; relatively little subsurface testing has been done. Most sites are in the proximity of former water sources, especially dry lake beds and, to a lesser degree, along river courses.

According to a cultural resources records search conducted by the San Bernardino Archaeological Information Center, only three prehistoric sites (CA-SBR-170, -1552, and -3509) have been documented in the Broadwell Valley. The location and extent of two of the sites is unclear. CA-SBR-170, recorded as a 1-mile-long village site, and CA-SBR-1552, recorded as a 20-acre jasper quarry, could not be relocated by Hatheway and McKenna (1990) during the recent cultural resources investigation. Given the general nature of eastern Mojave archaeology, it is doubtful that these two sites were properly mapped on the original site records. The existence of site CA-SBR-3509, a small lithic scatter, was verified by Hatheway and McKenna (1990).

No prehistoric or protohistoric sites were recorded during a recent cultural resources survey in the proposed project areas (Hatheway and McKenna 1990; McKenna 1990a,b). Six isolated artifacts were recorded in and adjacent to the proposed project area. Three (two jasper scrapers and one utilized flake of chalcedony) were found in the proposed project area (Section 25) and three (one andesite "core" and two chalcedony flakes, one of which was utilized) in adjacent buffer survey areas. The potential for buried prehistoric sites along the lakeshore edge is believed to be high because such sites have been found adjacent to other Pleistocene pluvial lakes.

Thirteen prehistoric artifacts from seven loci were identified along the proposed road realignment above the 100-year floodline in Sections 6, 31, and 36 at the southwestern end of Broadwell Lake. All 13 artifacts have been recorded as isolated finds. Eight of the 13 pieces recovered were prehistoric artifacts, four were identified as shatter (unused), and the remaining one was a miscellaneous fragment of possible cultural origin. All eight prehistoric artifacts were isolated finds scattered widely along the central portion of the proposed realignment. The distributional pattern of the isolated finds suggests that they were redeposited from a site somewhere to the southwest as a result of sheet wash. Their locations, therefore, reflect little to no spatial integrity.

No prehistoric isolates or sites were identified along the existing Crucero Road or along the two proposed alternative routes at the southern end of Crucero Road near Ludlow.

3.7.2 Historic Resources

Many of the original trails through the Broadwell Valley were established by Native Americans and followed by European explorers in the 1700s. Mormons used these trails in the mid-nineteenth century to link Salt Lake City with the West Coast. Between 1776 and 1880, military, scientific, and railroad surveys passed through the general vicinity. However, because of the harsh desert environment, the Broadwell Valley remained unknown to most Southern California pioneers.

The historic use of the Broadwell Valley was mainly associated with mining and mineral extraction between the 1880s and 1930s and military training in the 1940s. Types of historic resources expected are mining camps, mine shafts, mine tailings, and associated debris; railroad alignments, sidings, settlements, and associated debris; and World War II military training camps and associated debris.

Four historical archaeological sites were previously recorded within the Broadwell Valley but do not occur within the current project areas. CA-SBR-350-H is a mine north of the study area near Broadwell Lake. CA-SBR-3507-H is associated with the historic community of Broadwell (1905). It consists of a concentration of tin cans probably washed down an alluvial fan. CA-SBR-3508-H is the remains of a talc mine with additional evidence of 1940s military use. CA-SBR-3510-H consists of 1940s military training sites consisting of tank tracks, partial circles of rock, a socket wrench, and rusted K-ration cans.

Five historic sites have been identified within or adjacent to proposed project impact areas (Hatheway and McKenna 1990; McKenna 1990a). A segment of the National Trails Highway (Old Route 66) forms the frontage road for Interstate 40 north of Ludlow. The proposed access route, along Crucero Road, originates at the National Trails Highway.

The remains of the Tonopah and Tidewater Railroad (CA-SBR-2340-H) consist of the track berm, scattered railroad ties, and wooden culverts. Additional historic debris may be associated with the right-of-way. The railroad was established in 1905-1906 by Francis "Borax" Smith and was abandoned in 1933. The historic alignment represents an entire transportation route from Ludlow to Gold Center, which is significant to the historical contexts of borax mining in Death Valley, mining in the Cady Mountains, and the development of railroad communities such as Ludlow, Broadwell, and

Crucero. Smith transported his borax with mule teams before the construction of the railroad. The Tonopah and Tidewater Railroad has been recommended as eligible for the National Register of Historic Places because of the role it played in the mining and development in the region, and its association with Francis Smith, a pioneer in the minerals industry (McKenna 1991).

The historic Crucero Road extended from the town of Ludlow to the site of the community of Broadwell 12 to 15 miles to the north. The road was established at the time of the Tonopah & Tidewater Railroad. Features along the current road include telegraph poles, modern fire hearths, and small concentrations of railroad spikes, nails, and ties, which may indicate the dismantling of the rail line during World War II. None of these features are related to historic Crucero Road. Archival research suggests that the current road, referred to as Crucero Road, is not in the same location as the original historic route. Therefore, the road within the project area has been recommended not eligible for the National Register of Historic Places (NRHP).

The fourth site consists of the remains of a World War II desert training camp straddling Crucero Road. This site is one of a series of camps included in the Eastern Mojave Desert Military District, where armored cavalry training was conducted under the command of General George Patton. The military district is listed as a California historic landmark (California Department of Parks and Recreation 1990). Although the district has not been inventoried, site CA-SBR-3510-H is an element of the district. The site has been recommended as eligible for the NRHP because of the association with General Patton and its potential to contribute to the understanding of military history and training. Features evident at the site include cement foundations; rock alignments marking areas cleared for temporary buildings and tents, roadways, and paths; and trash scatters. There are also reports of buried stores of old military wares at the site. Other widely scattered isolated rock features are known to occur within the miliary district and are attributed to dispersed, short-term military activities. One such feature, a small rock alignment, was recorded seven miles north of the military camp along the proposed realignment of Crucero Road above the 100-year floodline. Much of the feature has been removed by erosion, and no artifacts were found in association; it is not considered eligible for the NRHP.

An historic debris scatter was recorded along a drainage channel in alternative access route 1A. Although the debris is most likely associated with the historic occupation of Ludlow, it is redeposited from some other locality outside the project area. This site is considered not eligible for the NRHP.

3.7.3 Native American Resources

Native American resources are sites, areas, and materials important to Native Americans for religious or heritage reasons. Resources may include prehistoric sites and artifacts, contemporary sacred areas, traditional use areas (e.g., native plant habitat), and sources for materials used in the production of sacred objects and traditional implements. Of primary concern in the environmental impact analysis process are concepts of sacred space that create the potential for land use conflicts. Fundamental to Native American religions is the belief in the sacred character of physical places such as mountain peaks, springs, and burial sites. Additionally, traditional rituals often prescribe the use of particular native plants, animals, or minerals. Therefore, activities that may affect sacred areas, their accessibility, or the availability of materials used in traditional practices may be of concern.

3.7.4 Paleontological Resources

The surficial geology of the Broadwell Lake area is Quaternary lacustrine and alluvial deposits (Dibblee 1967; Dibblee and Bassett 1966). The basin is bounded on the north, east, and west by granitic rocks, Tertiary volcanics, and continental sediments of the Cady Mountain complex.

The oldest documented vertebrate faunal assemblages in the region are the Black Butte Mine and the Logan Mine local faunas in the Cady Mountains (Miller 1980; Woodburne 1978; Woodburne et al. 1974, 1985). Fossils from these localities date to the late Arikareean land mammal age about 26 million years ago. Early Hemingfordinan land mammal age fossils have been documented as the Lower Cady Mountains local fauna in the Hector formation. Late Hemingfordinan fossils of the upper Cady Mountains local fauna have also been recorded (Miller 1980; Woodburne 1987; Woodburne et al. 1985).

The Broadwell Basin is part of a structural trough, which includes Bristol, Cadiz, and Danby lakes, and may have been part of an integrated drainage system to the Colorado River during moist periods of the Pleistocene (Thompson 1929; Blackwelder 1933; Hubbs and Miller 1948; Hewett 1954). Paleontological investigations by Reynolds (1988) yielded 22 taxa of Rancholabrean fossils in fine-grained sediments at Cadiz and Danby lakes.

A systematic paleontological survey was conducted in and adjacent to the proposed impact areas for the Repository, clay borrow area, Crucero Road access including proposed realignments, and the coarse borrow area (Reynolds 1990a, b). Eleven paleontological finds were identified around the west side of the lake at distances of up to one-half mile from the playa edge. The fossils have been interpreted as dating between 50,000 and 100,000 years BP, on the basis of a possible association with a late Pleistocene reddish-brown paleosol which occurs about four feet above the elevation of the playa (Reynolds 1990: 9-10). Fossils recovered include skeletal fragments of animals typical of a Rancholabrean assemblage: tortoise (*Gopherus* sp.), jackrabbit (*Lepus* sp.), fox (*Vulpex* sp.), small pronghorn (*Artiodoctyle*), and undifferentiated large and small mammals. San Bernardino County Museum staff have interpreted these fossils as significant nonrenewable paleontologic resources (Reynolds 1990:11-12).

3.8 AIR QUALITY

3.8.1 Climatic Conditions

3.8.1.1 Southeast Desert Air Basin

The Southeast Desert Air Basin (SEDAB), which includes the project area, lies in the western portion of the climatic subtropical desert region. The western boundary of the basin is about 100 miles from the Pacific Coast. In this desert region the summer days are extremely hot and dry. Maximum temperatures are about 100°F almost daily in midsummer and frequently occur from May to September, inclusive. Because of the rapid radiational cooling in the dry air, temperatures fall rapidly during the night both in summer and winter. In addition, in winter, there is some inflowing of cold air from the north. The winters are thus surprisingly cool and frosts are common, but rapid warming by day keeps daily mean temperatures above 50°F throughout the year.

Rainfall in the basin is of little significance. Average annual precipitation is in the range of two to six inches per year, except at high-altitude locations. Most of the precipitation at SEDAB is associated with winter frontal activity. Summer rain is in the form of sporadic thundershowers.

The potential for dispersion and dilution of pollutants in the SEDAB during the spring and summer is very good. Afternoon mixing heights may range from 6,000 to 8,000 feet above the surface and wind speeds of 8 to 14 miles per hour (mph). These higher wind speeds create mechanical turbulence which augments the thermal instability. During the nighttime and early morning hours, the dispersion potential is reduced because of lower mixing heights (about 1,000 feet above the surface) and wind speeds (6 to 8 mph). During the autumn and winter, the dispersion potential is reduced because mixing heights are low (ranging from 200 to 2,000 feet above the surface) and wind speeds are reduced (averaging 4 to 8 mph). The prevailing wind direction in the project area is westerly.

3.8.1.2 South Coast Air Basin

The South Coast Air Basin (SCAB), which includes most of the urban areas from which the hazardous waste would be transported to the Repository, lies within the California Mediterranean climatic region. The climate is characterized by warm to hot summers frequently tempered by sea breezes, by mild winters with temperatures seldom falling much below freezing except in high elevation areas, by an almost complete absence of rain for a period of two to six months during the summer, and by light to moderate rainfall during the winter months. Differences in elevation, exposure, slope, and distance from the ocean provide a great variety of local climates in the SCAB, but rainfall is light everywhere except in the high mountains. Nearly 90 percent of the annual rainfall in the SCAB occurs during November to April, inclusive. In the coastal plains, the average annual rainfall ranges for the most part from 10 to 20 inches, but some favorably situated locations at moderate elevations receive 25 to 30 inches. The highest peaks are covered by deep snow in winter, but no peak remains covered all year. Precipitation in the basin is associated with winter storms that move inland from the Pacific Ocean.

Summer maximum temperatures increase rapidly from the coast inland, and winter minimums decrease. The interior valleys, some of which have elevations of 1,000 to 2,000 feet, have hot summers and cool winters. Summer temperatures often exceed 100°F, and winter temperatures fall below freezing.

During the summer months, the dispersion and dilution of pollutants in the SCAB is at a minimum. Light winds and low mixing heights, caused by a persistent subsidence inversion, hamper dispersion by trapping air pollutants in a limited atmospheric volume close to the ground. The average wind speed in the SCAB is less than five mph on 80 percent of the days during the summer season. Topography also restricts the transport of pollutants from the basin. The basin is bounded by the Pacific Ocean to the southwest and high mountains along the perimeter. Inland, the SCAB is rimmed by rugged, high mountains with elevations to 11,500 feet, mainly in the northern and eastern parts of the area.

During the late autumn to early spring rainy season, the SCAB is subjected to wind flows associated with traveling storms moving through the area from the northwest. This period also brings a few days of strong Santa Ana winds each year. But during the dry season that coincides with the months of maximum photochemical smog concentrations, the wind flow is quite patterned, typified by a daytime sea breeze and a nighttime land breeze. This daily reversing flow also predominates during the other seasons, although it is not as persistent, day-to-day, as during the summer.

Ordinarily, the sea breeze is about twice as strong as the return flow (the drainage land breeze) and lasts longer during the warm months. The land breeze begins along the mountain slopes shortly after sunset during the winter, while on most summer nights the onset is after midnight. The winter drainage wind is a well-organized flow as it moves to the ocean; the summer counterpart is light and tends to meander toward the coast.

3.8.2 Ambient Air Quality

The pollutant emissions from sources and atmospheric interactions determine the quality of air. The pollution effects on receptors establish the extent to which air quality is degraded. Air quality in a given location is described by the concentration of various pollutants in the atmosphere which are expressed in units of concentration, generally parts per million (ppm) or micrograms per cubic meter

($\mu g/m^3$). The significance of pollutant concentration is determined by comparing it with an appropriate federal and/or state ambient air quality standard. These standards represent the allowable pollutant concentrations at which public health and welfare are protected and include a reasonable margin of safety. An area is designated by the EPA as being attainment for a pollutant if ambient concentrations of that pollutant are below the National Ambient Air Quality Standards (NAAQS) and nonattainment if violations of the NAAQS occur. Areas where insufficient data are available to make an attainment status designation are listed as unclassified. Unclassified areas are treated as attainment for regulatory purposes. The California Clean Air Act of 1988 also requires that areas of California be designated attainment, nonattainment, and unclassified for state ambient air quality standards.

Federal and/or California state ambient air quality standards have been established for the following pollutants: ozone (O_3), carbon monoxide (CO), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), particulate matter smaller than 10 micrometers in diameter (PM_{10}), lead (Pb), sulfate, hydrogen sulfide (H_2S), and vinyl chloride. The National and California Ambient Air Quality Standards are presented in Table 3.8-1.

The project site is about eight and one-half miles north of the community of Ludlow. This area is included in the Federal Southeast Desert Intrastate Air Quality Control Region (AQCR Number 33) and the California Southeast Desert Air Basin. The project area is classified by EPA as attainment for all federal criteria pollutants. The California Air Resources Board has classified the area as attainment for all state regulated pollutants, except PM_{10} and O_3. The only local stationary sources of pollution in the project vicinity are two gas stations in Ludlow and a fueling area at the airport, while mobile sources include traffic on Interstate 40, National Trails Highway, Santa Fe Railroad, and the airport.

The San Bernardino County Air Pollution Control District is the local agency responsible for issuing air permits and enforcing the rules and regulations issued by the district.

Although pollutant concentrations have not been measured at the proposed project site, air quality measurements are routinely made at a station in Barstow. This station is about 48 miles west of the proposed site. The air quality measurements made at Barstow should be representative of pollutant concentrations at the site, because there are no major sources of pollutant emissions in the area and the pollutants are uniformly dispersed over the region. A summary of maximum pollutant concentrations and the number of days state or federal ambient standards were exceeded in 1986, 1987, and 1988 at Barstow is presented in Table 3.8-2. Also shown in the table are the same statistics for the station reporting the highest concentrations in the SCAB. Because the waste would originate mainly from five counties in Southern California, most of the trucks transporting the waste to the Broadwell Repository would travel through the SCAB. Truck transportation on the highways would produce exhaust and fugitive dust emissions.

Table 3.8-1

Ambient Air Quality Standards

Pollutant	Averaging Time	California Standards Concentration	National Standards Concentration
Ozone	1 hour	0.09 ppm	0.12 ppm
Carbon Monoxide	8 hours	9.0 ppm	9 ppm
	1 hour	20 ppm	35 ppm
Nitrogen Dioxide	Annual Average	-	0.053 ppm
	1 hour	0.25 ppm	-
Sulfur Dioxide	Annual Average	-	80 $\mu g/m^3$ (0.03 ppm)
	24 hours	0.05 ppm (131 $\mu g/m^3$)	365 $\mu g/m^3$ (0.14 ppm)
	3 hours		1300 $\mu g/m^{3*}$ (0.5 ppm)
	1 hour	0.25 ppm	-
Suspended Particulate Matter (10 microns)	Annual Geometric Mean	30 $\mu g/m^3$	-
	24 hours	50 μ/m^3	150 $\mu g/mg^3$
	Annual Arithmetic Mean	-	50 $\mu g/m^3$
Sulfates	24 hours	25 $\mu g/ms^3$	-
Lead	30 Day Average	1.5 $\mu g/m^3$	-
	Calendar Quarter	-	1.5 $\mu g/m^3$
Hydrogen Sulfide (Chlorethane)	24 hours	0.01 ppm	-

Note: *Secondary Standard.

Table 3.8-2

Maximum Pollutant Concentrations and Number of Days Ambient Standards Were Exceeded at Barstow, California, and in the South Coast Air Basin 1986 - 1988

Barstow

		1986		1987		1988	
Pollutant	**Averaging Time**	**Concentration**	**Days S/F**	**Concentration**	**Days S/F**	**Concentration**	**Days S/F**
Ozone (ppm)	1 hour	0.15	46/5	0.15	31/1	0.15	46/7
Carbon Monoxide (ppm)	1 hour	8	0/0	6	0/0	13	0/0
	8 hours	3.4	0/0	4.3	0/0	3.8	0/0
Nitrogen Dioxide (ppm)	1 hour	0.15	0/NA	0.13	0/NA	0.09	0/NA
	Annual	0.021	NA	0.025	NA	0.022	NA
Sulfur Dioxide (ppm)	1 hour	NM	NA	NM	NA	NM	NA
	24 hours	NM	NA	NM	NA	NM	NA
	Annual	NM	NA	NM	NA	NM	NA
Particulates PM_{10} ($\mu g/m^3$)	24 hours	161	11/1	88	9/0	63	5/0
	Annual (GM)	35.9	NA	25.5	NA	37.0	NA
	Annual (AM)	40.1	NA	32.9	NA	38.9	NA

South Coast Air Basin

		1986		1987		1988	
Pollutant	**Averaging Time**	**Concentration**	**Days S/F**	**Concentration**	**Days S/F**	**Concentration**	**Days S/F**
Ozone (ppm)	1 hour	0.35	217/164	0.33	196/162	0.35	216/178
Carbon Monoxide (ppm)	1 hour	27	11	26	12/0	32	21/0
	8 hours	19.7	58/49	19.6	48/43	27.5	65/60
Nitrogen Dioxide (ppm)	1 hour	0.33	9/NA	0.42	7/NA	0.54	11/NA
	Annual	0.061	NA	0.055	NA	0.061	NA
Sulfur Dioxide (ppm)	1 hour	0.13	0/NA	0.09	0/NA	0.15	0/NA
	24 hours	0.039	0/0	0.025	0/0	0.036	0/0
	Annual	0.008	NA	0.006	NA	0.007	NA
Particulates PM_{10} ($\mu g/m^3$)	24 hours	294	60/8	219	58/9	289	65/11
	Annual (GM)	111.2	NA	73.5	NA	91.9	NA
	Annual (AM)	111.3	NA	89.6	NA	104.6	NA

Notes: GM: Geometric Mean
AM: Arithmetic Mean
S/F: State/Federal Standard
NA: Not Applicable
NM: Not Measured

The SCAB is one of the most highly polluted regions in the United States. As shown in the table, relatively high concentrations of O_3, CO, NO_2, and PM_{10} occur frequently in the basin. Both the federal and state ambient standards for these pollutants are violated frequently each year. Only SO_2 concentrations are below the ambient standards. This situation occurs because there are no major sources of SO_2 emissions in the basin.

Except for O_3 and PM_{10} particulates, pollutant concentrations in the proposed project area are relatively low and do not exceed the state or federal standards. The O_3 concentrations, which in the Broadwell Lake region frequently exceed the state O_3 ambient standard and occasionally exceed the federal standard, are principally the result of the transport of O_3 and its precursors from the South Coast and San Joaquin Valley air basins into the Southeast Desert Air Basin.

The transport of pollutants from the SCAB takes place mainly through Soledad Canyon and Cajon Pass, while the transport from the San Joaquin Valley is through the Tehachapi Pass. The higher PM_{10} concentrations in the Broadwell Lake area are caused by fugitive dust generated from wind erosion. Wind speeds in this desert area exceed 16 mph about eight to 10 percent of the time.

3.9 WATER SUPPLY

3.9.1 Surface Water

The proposed site is in an arid region of the Mojave Desert. The average annual precipitation is less than 4 inches, with 140 inches of evaporation annually. Consequently, no permanent surface water bodies appropriate for water supply exist in the vicinity of the project area.

3.9.2 Groundwater

To determine the availability of potable water for the project, a groundwater supply test well and two observation wells were installed approximately 4,300 feet west of the playa by EMCON Associates (Brown and Caldwell Consultants 1990). Two primary aquifer characteristics, transmissivity and storativity, were analyzed to determine the water production capabilities of the alluvial sediments for water supply during the construction and operations phase of the project. Transmissivity measures the ability of the sediments to yield water to a well, and storativity is a measure of the amount of water stored in the openings of the sediments that can potentially be released to a well.

The constant discharge test of April 1990 pumped for a continuous 48 hours at 453 gallons per minute (gpm)(Brown and Caldwell Consultants 1990). Utilizing the Hantush Artesian Method and corroborated by the Cooper-Jacob Straight Line Method and the This Recovery Method, analysis of the test well data provided a good estimate of the "effective" transmissivity under the semiconfined conditions with downward movement of groundwater during the pumping of the well. The results of the analysis indicated that the storage in the overlying unconfined aquifer and confining bed are sufficient to provide recharge throughout the period of pumping, and no additional drawdown should occur once conditions stabilize.

The aquifer test analysis also indicated that there was greater than expected drawdown in the pumped well. This condition causes the well to exhibit low efficiency at high discharge rates, such as the 453 gpm of the aquifer test. However, the well is adequate to be used for water supply purposes at a much lower discharge rate, as described below.

To estimate the influence on the lake bed sediments caused by long-term pumping from the test well in the alluvial sediments, a simple numerical groundwater flow model was used. The pumping conditions of 275 gpm for one year (project construction period) were simulated. Under these conditions, the aquifer drawdown reached steady-state conditions, and while the radius of zero drawdown would extend out to the playa, the predicted drawdown in the confined aquifer was very small (less than 0.10 foot at a distance of about 3,800 feet and about 0.20 foot at about 2,900 feet from the test well). This suggests that even though the radius of zero drawdown could extend to the playa, it would exert little or no influence on the groundwater beneath the playa. The influence of pumping at 50 gpm for 20 years (operations period) also would reach steady-state conditions. The predicted radius of zero drawdown would extend to about the edge of the playa, but there would be little, if any, drawdown (<0.02 foot) (Brown and Caldwell Consultants 1990).

3.9.3 Water Quality

To establish background water quality, samples were analyzed for metals and general minerals using appropriate EPA methods (EMCON Associates 1990b). The analyses identified iron, manganese, chloride, total dissolved solids, sulfate, and conductivity at levels in excess of secondary drinking water standards established by the EPA. The analytical results are shown in Tables 3.9-1 and 3.9-2.

Table 3.9-1

Analytical Results - Metals Analyses
Broadwell Dry Lake, California

Metals	Alluvial Test Well (E 0-1) (μg/L)
Arsenic	-
Barium	-
Cadmium	-
Chromium	-
Copper	<0.05
Iron	14
Lead	-
Manganese	0.21
Selenium	-
Silver	-
Zinc	<0.05

Source: Brown and Caldwell Consultants 1990.

Table 3.9-2

Analytical Results - General Mineral Analyses Broadwell Dry Lake, California (Alluvial Test Well)

	mg/l
Anions (negatively charged Ions)	
Nitrate (as NO_3)	<0.1
Chloride	560
Sulfate	56
Bicarbonate (as HCO_3)	-
Carbonate (as CO_3)	-
Cations (Positively charged Ions)	
Sodium	460
Potassium	13
Calcium	9.4
Magnesium	1.7
Manganese	0.21
Nitrate	<0.1
Ammonia	<0.03
Hydroxide Alk (as $CaCO_3$)	-
Carbonate Alk (as $CaCO_3$)	-
Bicarbonate Alk (as $CaCO_3$)	-
Ca Hardness (as $CaCO_3$)	-
Mg Hardness (as $CaCO_3$)	-
Total Hardness	-
Surfactants (MBAS)(1)	-
Filterable Residue (TDS)(2)	1,400
Sp. Conductance, µmhos/cm(3)	2,400
pH, Units	-

Notes: (1)MBAS - methylene blue active substances
(2)TDS - total dissolved solids
(3)µmhos/cm - micro-ohms per centimeter

The groundwater analytical results indicate that groundwater in the vicinity of the test well is of sufficient quality for use in industrial applications. However, the water is not suitable for use as a potable water supply or virtually any other beneficial use because of high salinity levels.

3.10 SCENIC/VISUAL RESOURCES

The scenic/visual resources technical report for the project area was provided by Geographics (1990 and 1991). The following sections are primarily taken from that report.

The analysis focuses on the proposed facilities located within Section 25, the proposed access route, which generally follows existing Crucero Road between the site and the community of Ludlow, and the proposed coarse borrow area in portions of Sections 14, 23, and 24, generally northwest of the Repository site.

The baseline environmental conditions of the site in its current status consist of three elements: site visual characteristics, site viewshed and observers, and site visual sensitivity. Visual characteristics are the basic structural aspects of the overall setting which have visual significance. Viewshed and observers define and describe the area from which the project is viewed, with determinations about the number of observers and the most significant viewpoints. Visual sensitivity is a measure of the combined effects of visual characteristics and viewshed/observers. How visually prominent is the project site and how exposed is it to significant views?

3.10.1 Site Visual Characteristics

Residuals Repository Site. Broadwell Lake is a flat, dry lake approximately four miles long. It is surrounded by broad, sloping alluvial fans which ascend to the enclosing desert mountain ranges: the Bristol Mountains to the east, Cady Mountains to the west, the low pass between the Bristol and Cady mountains to the north, and the Bullion Mountains to the south. Vegetation is almost completely absent from the lake bed, is sparse on the alluvial fans, and the mountains appear to be nearly bare, even from a short distance.

The overall visual effect of the Broadwell Lake Basin is one of vastness, an open sweep of desert landscape without any striking central visual focus. The surrounding mountains lack the striking, steep aspects which give some other eastern Mojave ranges, such as the Providence or New York mountains, their special visual value. The Broadwell Lake Basin lacks the juxtaposition of flat and steep landscapes which can give desert landscapes a unique visual identity (Schauman 1979). The interior of the basin itself is without distinctive visual elements such as a dune area (Kelso Dunes) or volcanic feature (Amboy Crater) which give unique visual focus to some other Mojave basins. The Broadwell Lake Basin is a combination of features generally common to the physiographic region, and lacks a striking visual focus. Within this overall landscape the whitish-tan expanse of the lake bed serves as a minor visual attraction. It stands out from the vast surrounding basin primarily because of distinctive color and because it lacks the textural element provided by sparse vegetation on the surrounding alluvial slopes.

The overall aspect of the basin is one of an area generally unmarked by dramatic human intrusion, particularly when viewed from the Interstate 40 travel corridor. This generally unmarred appearance belies a number of human intrusions more apparent when viewed from various points along Crucero Road which runs north-south, bisecting the Broadwell Basin. A limited number of dirt roads thread through areas of the basin, and an abandoned rail line bisects the basin and lake bed in a north-south direction. A transmission line route parallels Interstate 40 approximately two miles north of the freeway.

Changing atmospheric and lighting conditions greatly affect the viewing of desert landscapes. Indeed, sky -- its illumination, weather conditions, and relationship to the ground -- has been cited as one of the major visual components of the desert experience (Smardon 1977). Visual perceptions of human intrusions on desert landscapes are affected by changing light and atmospheric conditions. A pole line that stands out starkly when highlighted by a setting sun may nearly disappear when viewed through wind-raised dust in the noon heat haze. A reflective white surface can be seen for miles under certain conditions, but if backlit at other times it may be quite unobtrusive.

Coarse Borrow Area. The proposed coarse borrow area site is located on an alluvial fan descending from the Cady Mountains. The vast majority of the site surface consists of uniformly sloping alluvial material dotted with creosote bush scrub, but there are several bedrock intrusions associated with the adjacent Cady Mountains. The site closely approaches the base of the mountains and a large reddish bedrock hill some 100 feet high lies within the site and would be removed entirely as part of the proposed mining operation. A bedrock finger extends from the mountains into the western portion of the site and portions of it would also be quarried under the proposed plan.

The coarse borrow area site is without significant striking visual features, consisting of visual elements common to both the balance of the overall Broadwell Basin and the Mojave region. There is little immediately visible evidence of human intrusion on the site, although a small dirt access road to the abandoned Old Dominion Mine in the Cady Mountains crosses immediately to the south of the site. Claim stakes placed within the last several years are located at various points on and adjacent to the site, but these generally become hidden by creosote bush when the viewpoint is more than several hundred feet distant.

3.10.2 Project Viewshed and Observers

Residuals Repository Site. The project viewshed is substantial. Sitting as it does, in the center of a vast basin, the proposed project would be potentially visible from viewpoints within an approximate 160-square-mile area. Potential viewpoints within this viewshed range from those directly adjacent to the project site to those more than 10 miles distant to the south. While the viewshed is substantial, the number of significant viewpoints within that area is limited and the number of observers relatively small.

The primary significant viewpoints are along Interstate 40, which runs east-west approximately eight and one-half miles south of the project site, and from the community of Ludlow. The proposed project site is visible from Interstate 40 for approximately a 4.2-mile-long section of the highway. It becomes visible from approximately one-half mile west of the community of Ludlow to a point approximately 3.7 miles to the east of Ludlow. Traffic flow in this portion of Ludlow currently is about 9,500 vehicles per day.

Roads form a strong visual focus for drivers on them. The cone of vision for drivers is generally considered to be 50 to 60 degrees facing forward. To some extent the lake bed, with its location at the base of long alluvial slopes and with its contrasting color, serves as a minor visual focal point for drivers along Interstate 40, increasing the likelihood of their attention straying from the road to focus on the lake bed.

The community of Ludlow, with its small cluster of residences and varied roadside service businesses, is the only area of fixed significant viewpoints within the project viewshed. Ludlow is approximately seven and one-half miles to the south of the project site. The proposed paved Crucero Road would begin in Ludlow. Other potential viewpoints along Crucero Road or other area dirt roads are of much lesser significance, because of the extremely sparse traffic.

Coarse Borrow Area. The viewshed for the coarse borrow area site is generally similar to that discussed for the residuals Repository site itself. The viewshed is substantial, encompassing an approximate 160-square-mile area. It includes portions of Interstate 40 some nine and one-half miles south of the site, as well as the community of Ludlow along Interstate 40.

As previously discussed, the community of Ludlow and Interstate 40 constitute the area's primary significant viewpoints. The proposed coarse borrow area site has slightly lesser degrees of exposure to these viewpoints than does the Repository site itself. The borrow area site is not only one mile more distant than the Repository, but is also located farther to the west. In fact, the borrow area site is nearly concealed from Ludlow by a low, outlying hill extending from the Cady Mountains approximately five miles south of the site. These hills intervene between the borrow area and viewers along Interstate 40 west of Ludlow. From Ludlow itself, the borrow area is visible slightly above the upper crest of these low hills. Other potential viewpoints, such as those along Crucero Road or on other dirt roads in the basin, are of minimal significance because of the extremely small number of potential viewers.

3.10.3 Site Visual Sensitivity

Residuals Repository Site. Visual sensitivity is the sum of the combined effects of the overall site visual characteristics together with the viewshed and observers. How visually prominent is the project site and how exposed is it to significant views?

Desert landscapes, with their clear panoramas, open aspect, and expanses of uniform natural landscape patterns, have the potential for high visual sensitivity. Landscape additions that vary from the existing in form, line, color, or texture have the potential to be highly visible.

The proposed project site is highly exposed to a substantial viewshed. Within that viewshed, however, significant viewpoints are more than seven miles from the site and the numbers of viewers are relatively few. Potential observers with exposure to the site at close vantages would be extremely few in number.

Coarse Borrow Area. The proposed coarse borrow area site is highly exposed to a substantial viewshed. Within that viewshed, however, significant viewpoints are more than eight miles from the site and the number of viewers is relatively small. Potential observers with exposure to the site at close vantages are extremely few in number. Overall site sensitivity, therefore, is low.

3.11 TRANSPORTATION/CIRCULATION

3.11.1 Transportation/Circulation System

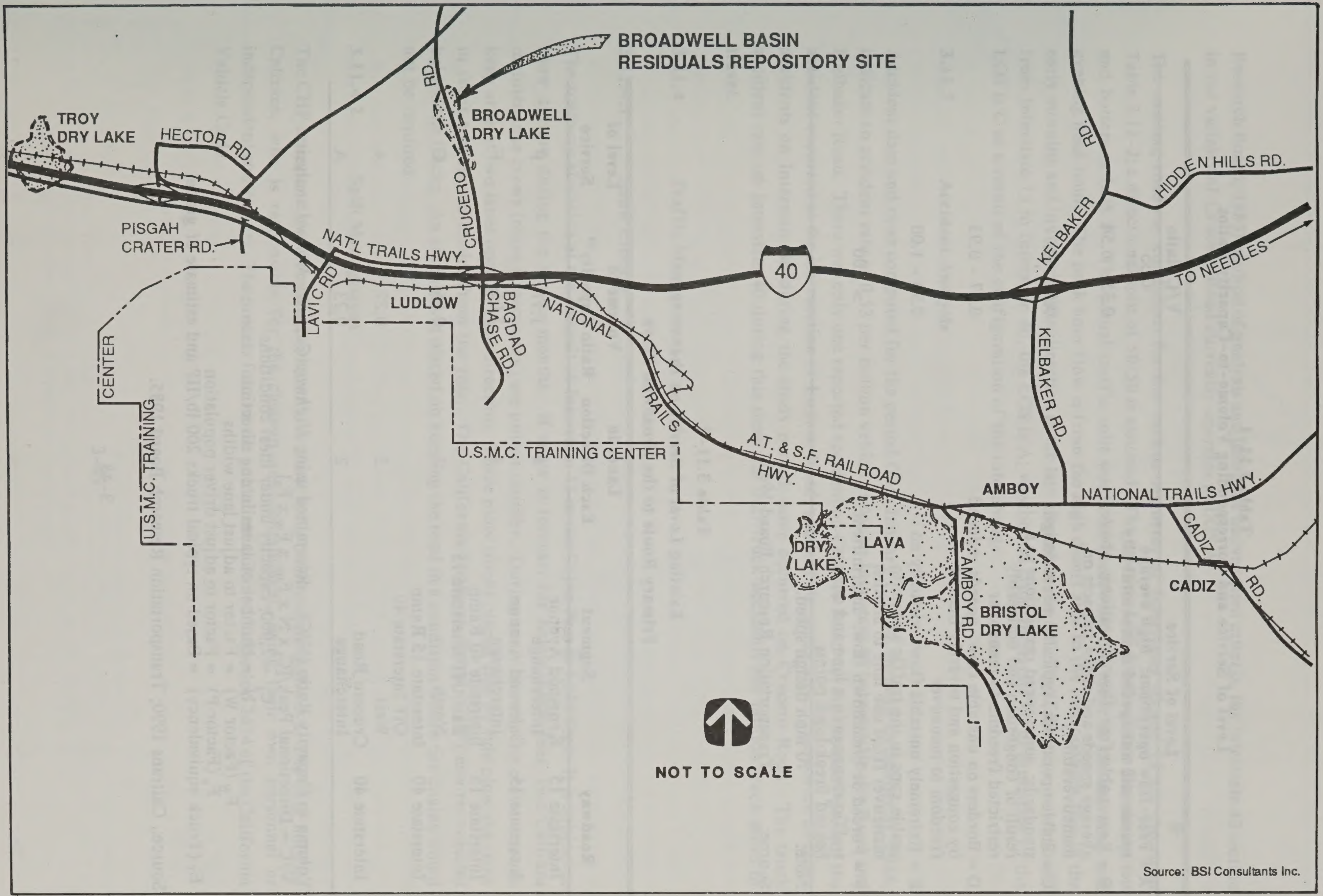
The proposed Broadwell Basin Residuals Repository would be located in the Broadwell playa along Crucero Road, approximately eight and one-half miles north of Ludlow, California. Access to Crucero Road is from Interstate 40, both eastbound and westbound. It is assumed that the truck traffic would utilize Interstate 40 via Interstate 15 through the Cajon Pass as the primary route from the major urban centers of Southern California. Access to Interstate 40 is obtained from Interstate 15 in Barstow, California, approximately 60 miles west of the Crucero Road exit (Figure 3.11-1).

3.11.2 Existing Traffic Conditions

Roadway capacity is generally defined as the number of vehicles that can be reasonably expected to pass over a given section of road in a given time period. It is possible to identify the maximum desirable capacity for typical roadway types based on the number of lanes, the composition of the traffic utilizing the roadway, and the physical characteristics of the roadway including lane width, lateral clearances, design speed, and grade. Roadway capacity is used to quantify the level of service (LOS) at a given segment of road. Roadway volumes are divided by capacity (V/C) to determine a ratio of the roadway's design capacity that can be expressed in a percentage form to relate to the LOS. A V/C ratio corresponds to each letter rating and nears 1.0 as the traffic volume carried by the roadway approaches the design carrying capacity of the system.

Roadway LOS is a qualitative measure describing operational conditions within a traffic stream. It generally describes these conditions in terms of such factors as speed and travel time, freedom to maneuver, traffic interruptions, comfort and convenience, and safety (Table 3.11-1). Conditions range from excellent (LOS A) to overloaded (LOS F).

Crucero Road is currently an unimproved dirt road from approximately 100 feet north of the Interstate 40 junction to the Broadwell playa. The existing traffic is minimal, primarily utilizing the services located in Ludlow just off the freeway. Traffic volume counts have determined that mid-day is the peak hour (when maximum traffic volumes occurred at the intersection). The volume-to-capacity ratio, shown on Table 3.11-2, has been adjusted to reflect the percentage of heavy vehicles (truck traffic), roadway grades, and the peak hour vehicle split of 70/30 percent directional split for the Crucero Road/Interstate 40 interchange. Based on the *Highway Capacity Manual* (Transportation



Source: BSI Consultants Inc.

Figure 3.11-1 Roads in the Vicinity of Proposed Broadwell Basin Residuals Repository

Table 3.11-1
Level of Service and Corresponding Volume-to-Capacity Ratios

Level of Service	V/C Ratio
A = Free-flow operations: high average speeds and unimpeded maneuverability	0.35
B = Reasonably free-flow operations: above average speeds and slight impacts on maneuverability	0.35 - 0.54
C = Stable operations, typically meets design standards: some speed restrictions as a result of congestion and noticeably restricted freedom to maneuver	0.54 - 0.77
D = Borders on unstable flow: speeds reduced by congestion and severely limited freedom to maneuver	0.77 - 0.93
E = Extremely unstable flow: virtually no usable gaps in the traffic stream to maneuver from one lane to another	0.93 - 1.00
F = Forced or breakdown flow: intermittent traffic stoppage in a lane and queues behind breakdown points	> 1.00

Note: 70 mph design speed.

Source: Transportation Research Board 1985.

Table 3.11-2
Existing Level of Service on the
Primary Route to the Broadwell Playa

Roadway	Segment	Lanes in Each Direction	Volume to Ratio Capacity[1]	Level of Service
Interstate 15	Kenwood Avenue Interchange	4	1.11	F
Interstate 15	Oakwood Avenue Interchange	4	1.05	F
Interstate 15	Interstate 40 Ramp East Off Interstate 15 North	2	0.65	C
Interstate 40	Interstate 15 Ramp Off Interstate 40 West	2	0.27	A
Interstate 40	Crucero Road Interchange	2	0.23	A

[1] Volume to Capacity Ratio (V/C) - determined using *Highway Capacity Manual* analysis:
$V/C = \text{Directional Peak}/[C_j \times N \times F_{HV} \times F_W \times F_p]$
C_j = 2,000; capacity under ideal conditions
N = Number of lanes in one direction
F_W (Factor W) = Factor to adjust lane widths
F_p (Factor P) = Factor to adjust driver population
E_T (Truck equivalency) = Based on typical trucks 200 lb/IIP and estimate of grade.

Source: Caltrans 1990; Transportation Research Board 1985.

Research Board, 1985) method of analysis and using the above stated criteria, the Interstate 40 section in the vicinity of Crucero Road currently operates at LOS A.

The existing roadway conditions for the various segments of Interstates 40 and 15 are shown in Table 3.11-2; a directional split of 50/50 is assumed. The existing LOS for the Cajon Pass at the top and bottom is LOS F. The actual traffic split would be somewhat different in the morning and evening peak hour. The peak hour flow is from the high desert area to the metropolitan area in the early morning and in the opposite direction in the late afternoon. In the City of Barstow, northbound from Interstate 15 to Interstate 40, the LOS is A; westbound from Interstate 40 to Interstate 15 the LOS is C as a result of the configuration of the interchange.

3.11.3 Accident Analysis

Accident data and rates computed for the period from January 1, 1986, through December 31, 1988, indicate an accident rate of 0.53 per million vehicle miles on Interstate 40 between Hector Road and Kelbaker Road. There was only one reported accident on Crucero Road during the study period; the accident occurred at the intersection of Ludlow Road, south of the study area. There were 67 truck accidents on Interstate 40 during the study period; none occurred on Crucero Road. The truck accident rate on Interstate 40 during this time was 0.27 truck accidents per million truck miles of travel.

3.11.4 Traffic Management

3.11.4.1 Snow Closure

The roadway elevation at the summit of Interstate 15 in the Cajon Pass is 4,200 feet. It is subject to snow closure during the winter months. If snow is forecast for below 5,000 feet, two Caltrans maintenance crews (more if necessary) are put on standby. During snow storms, the crews work to keep at least two lanes open in each direction. Three plow trucks placed side by side plow the snow in front and spread cinder from the rear. The California Highway Patrol (CHP) escorts vehicles behind the trucks. An emphasis is placed on keeping the road in a condition where tire chains would not be required.

3.11.4.2 Spill Management

The CHP is responsible for managing hazardous waste spills on interstate highways. The CHP notifies Caltrans, who is responsible for the cleanup and containment, using their own personnel or independent contractors. The process follows the guidelines outlined in Section 2454 of the California Vehicle Code.

Caltrans, using rough estimates of volumes of hazardous material shipments in California as a benchmark, found relatively few incidents of hazardous materials spills or releases on the state highways; even fewer accidents involve hazardous wastes. According to the Caltrans report to the legislature, *Transportation of Hazardous Materials in California by Highway and Rail*, three percent of 103 hazardous materials accidents in 1985 involved hazardous waste spills from truck accidents. The study found the primary reason for the accidents to be human error.

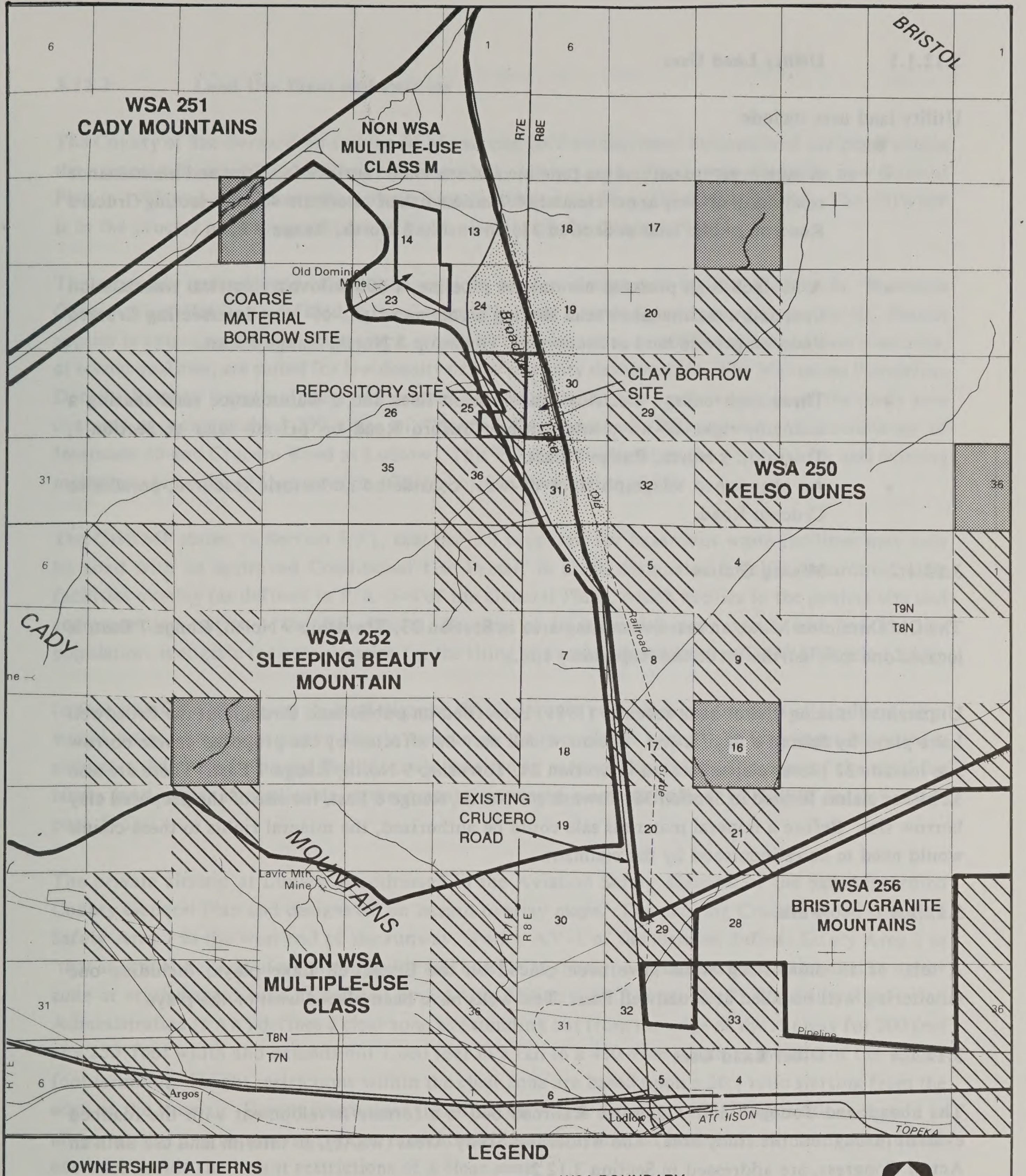
3.12 LAND USE

3.12.1 Surrounding Land Use

The proposed project area consists of a broken pattern of federal and private ownership generally occurring in north-south oriented columns, referred hereafter as a checkerboard ownership pattern. The majority of the private holdings are held by the Santa Fe Real Estate Company (formerly the Southern Pacific Railroad Company) (Figure 3.12-1).

The land use study area includes the northern part (north of Interstate 40) of the unincorporated community of Ludlow and extends north 12 miles to the Broadwell Pass. The Ludlow portion of the study area consists of approximately 300 acres in Section 5, Township 7 North, Range 7 East. Interstate 40 forms the southern boundary. Private property is served by National Trails Highway, a county-maintained road, and a frontage road of the interstate that intersects with Crucero Road. Crucero Road is a county-maintained road for only the first 0.3 mile, where it reverts to an undesignated, graded, unsurfaced road. The majority of the study area within Ludlow is characterized by undeveloped open space. Development consists of a gasoline service station, two residences (one abutting Crucero Road, the other west of Crucero Road [served by National Trails Highway]), and a private airstrip, closed to public entry, consisting of two airplane hangars and a dirt airstrip. A graded area at the intersection of Crucero Road and National Trails Highway is identified by a sign as Ludlow Field, apparently a former recreational facility of Ludlow.

The study area north of Ludlow and Section 5 is unoccupied open space devoid of any permanent dwelling units. Human occupancy apparently consists of undesignated campsites as evidenced by recent fire-rings and litter at an extremely low number of sites scattered throughout the study area along existing routes of travel. Development is very sparse and is limited to utility rights-of-way and associated structures and facilities, unpatented mining claims, monitoring and test wells, and historical abandoned rights-of-way.



Source: Johnson Valley Desert Access Guide.
BLM Final Wilderness Inventory Decision

Figure 3.12-1 Land Ownership Patterns and Wilderness Study Areas in the Vicinity of Proposed Broadwell Basin Residuals Repository

3.12.1.1 Utility Land Uses

Utility land uses include:

- A high pressure natural gas pipeline and associated surface facilities and maintenance road right-of-way approximately 0.7 mile north of Interstate 40, intersecting Crucero Road on public land at Section 32, Township 8 North, Range 8 East.

- A 36-inch high pressure natural gas pipeline, a 500-kilovolt electrical transmission line, and a maintenance road sharing a common right-of-way, intersecting Crucero Road on private land at Section 29, Township 8 North, Range 8 East.

- Three high-energy electrical transmission lines and a maintenance road sharing a common right-of-way, intersecting Crucero Road on private land at Section 1, Township 9 North, Range 7 East.
- An abandoned telegraph right-of-way, considered an historic resource, parallel to Crucero Road.

3.12.1.2 Mining Claims

The Old Dominion Mine, an inactive mining area in Section 23, Township 9 North, Range 7 East, is located one mile northwest of the Repository site.

Unpatented mining claims have recently (1989) been filed on public land throughout the Broadwell Lake playa by Santa Fe Pacific Inc. Claims which may be affected by the proposed coarse borrow site include 32 placer claims located in Section 24, Township 9 North, Range 7 East. There are also 32 placer claims located in Section 30, Township 9 North, Range 8 East, the site of the proposed clay borrow site. Before a mineral materials sale could be authorized, the mineral rights to these claims would need to be relinquished by the claimant.

3.12.1.3 Wells

A total of 17 monitoring wells have been placed on the Broadwell Lake playa, including one monitoring well installed at Broadwell Pass. Test wells have been placed west of the playa.

3.12.1.4 Other Land Uses

The abandoned Tonopah and Tidewater Railroad bed is a former development with the roadbed evident throughout the study area. The Wilderness Study Areas (WSAs), an interim land use until an Act of Congress, are addressed in Section 3.12.2.

3.12.2 Land Use Plans and Policies

The County of San Bernardino and the BLM exercise land management through land use plans within the proposed Broadwell Basin Residuals Repository project area. The county adopted a new General Plan in 1989 and the County Hazardous Waste Management Plan (CHWMP) in 1990. The CHWMP is in the process of being incorporated as an element of the General Plan.

The privately owned land within the project area is designated by the County as "Resource Conservation" (RC). As defined in the General Plan and County Development Code, the RC district applies to extensive areas of open space, which by their location, access limitation, natural resources, or scenic qualities, are suited for low density or low intensity development. The Maximum Population Density Average is approximately 45 persons per square mile. The Ludlow portion of the study area contains approximately 3,200 acres of "Planned Development" (PD) around the interchange of Interstate 40 and Crucero Road at Ludlow. This PD district identifies the potential for and existing mixed use activities at that location (County of San Bernardino 1989).

The CHWMP states, in Section 5.3.1, that project proposals for hazardous waste facilities may only be sited with an approved Conditional Use Permit in areas designated specific hazardous waste facilities overlay (as defined in P/A-5-4 of the General Plan), which applies to the project site and corresponding buffer. The RC district, because of its extensive open space with low density population, is eligible for consideration for the siting of a residuals repository (CHWMP Section 5.3.1).

In fact, the CHWMP states: "a land disposal facility would require large amounts of land and, thus would be more appropriate to site in remote or less populated areas... It is evident from these estimates that a land disposal facility could be sited in rural or desert lands because of the need for larger land areas, if applicable environmental concerns were addressed" (CHWMP Section 5.2.5, page 5-5).

The private airstrip at Ludlow is addressed in the Aviation Safety Element of the San Bernardino County General Plan and designated on hazard overlay maps. The existing Crucero Road is within Safety Area 1 at the west end of the runway. Policy AV-1 of the element defines Safety Area 1 as "that area at either end of a runway inside and outside of the airport boundaries, and labeled as a clear zone or crash hazard zone as defined by FAA or Military AICUZ studies." The Federal Aviation Administration (FAA) defines a clear zone as extending out from the edge of the runway for 200 feet at a 250-foot width and extends out 1,000 feet in a fan to a 450-foot width at the end of the 1,000-foot terminus. Height restrictions within the clear zone are based upon a 20:1 ratio starting from the edge of the runway. Height restrictions therefore vary with distance. Height restrictions pertain to all permanent and temporary structures and could include even road beds and vehicles if they would encroach inside the height restrictions of a clear zone.

3.12.2.1 California Desert Conservation Area Plan

The California Desert Conservation Area (CDCA) was designated by Congress with the passage of the Federal Land Policy and Management Act (FLPMA) in 1976. The CDCA encompasses 25 million acres of Southern California, of which 12.1 million acres are public land. The purpose of establishing the CDCA was "to provide for the immediate and future protection and administration of the public lands in the California desert within the framework of a program of multiple-use and sustained yield, and the maintenance of environmental quality" (FLPMA Section 601[b]).

FLPMA directed the BLM to prepare and implement a comprehensive, long-range plan for the management, use, development, and protection of the public lands within the CDCA. Over the next four years a detailed inventory of public land within the CDCA was conducted involving extensive public involvement. This comprehensive planning effort resulted in the CDCA Plan in 1980.

The CDCA Plan is made up of two components. The first component consists of four multiple-use class designations and resource management guidelines (CDCA, pp. 15-20) for the designations. The second component is the plan elements, which provide for more specific application of the multiple use class guidelines for a specific resource or activity and are addressed in 12 plan elements.

Component One. The proposed Broadwell Basin Repository is located entirely within CDCA planning unit 63 on land designated "multiple use class" moderate use (Class M). Class M is designed to provide for a wide variety of present and future uses such as mining, livestock grazing, recreation, and energy and utility development, while also conserving desert resources. It also includes provisions to mitigate damage to those resources which permitted uses may cause. Examples of Class M guidelines (CDCA Plan, pp 15-20) that may apply to the siting of hazardous waste facilities are as follows:

- New distribution facilities may be allowed and shall be placed within existing rights-of-way where they are reasonably available.
- Except as provided in applicable law and policies, new material sales locations, including sand and gravel sites, will require an environmental assessment.
- Public lands managed by BLM may not be used for hazardous waste disposal. Where locations suitable for such disposal are found on BLM-managed lands, consideration will be given to transfer of such sites to other ownership for this use.

Component Two. The wilderness, motorized-vehicle, energy production, and utility corridors are applicable elements of the proposed project as well as of other resources, such as biology and cultural resources, and are discussed in other sections of this document.

3.12.2.2 Wilderness Element

The wilderness element of the CDCA Plan has delineated four WSAs in the project area, designated as Kelso Dunes WSA 250 (WSA 250), Cady Mountains WSA 251 (WSA 251), Sleeping Beauty Mountain WSA 252 (WSA 252), and Bristol/Granite Mountains WSA 256 (WSA 256). WSA 250 appears to have retained natural values with limited exceptions, such as the off-road vehicle tracks in the southeast area of Broadwell Lake. Variety of terrain, numerous enclosed areas, and the immensity of the landscape offer outstanding opportunities for solitude. Opportunities for a primitive and unconfined type of recreation are also outstanding. WSA 251, with its extreme size, gives the visitor a feeling of isolation in the sandy valleys and among the highly eroded, exposed ridges. However, the portion to the north lacks vegetative or topographic screening and has only limited opportunities for solitude and primitive types of recreation. WSA 252 is relatively undisturbed by man. Man's influence consists of a few primitive ways and abandoned mine shafts and prospect holes. Many outstanding opportunities for solitude exist for primitive and unconfined types of recreation. WSA 256, in the vicinity of Crucero Road, is an isolated enclave connected to the rest of the WSA by a single section corner. This area has not retained its primeval character. Man's impacts, which include an unimproved road, a pipeline right-of-way, and the old Tonopah and Tidewater Railroad grade, together with the small size of the holding, would not present any opportunity for solitude. Opportunities for a primitive and unconfined type of recreation are poor for this portion of the WSA.

Three WSAs (250, 252, and 256) use Crucero Road as a boundary. The Final Environmental Impact Statement of the CDCA Plan in Appendix III, Wilderness, describes Crucero Road as a well-graded road with a telephone line (telegraph) right-of-way. The WSA boundaries along Crucero Road would begin at the point of non-disturbance from the road. Field observation of the road indicates the point of non-disturbance to generally be the toe of the graded berm, which is linear and parallel on both sides of the road, formed by periodic grading in the past. The telephone line right-of-way would refer to the single wooden pole telegraph line which parallels Crucero Road and/or the abandoned historic Tonopah and Tidewater Railroad bed. The pole line is likewise abandoned with lines and insulators missing and even poles in many instances sawed down. The poles are considered an historic resource, and are generally surrounded by undisturbed ground.

The WSAs are the result of the implementation of the FLPMA of 1976 (FLPMA 43 U.S.C, §1701 et Seq.), which required the Secretary of the Interior to review areas of public lands determined to meet criteria of wilderness characteristics, and to report recommendations as to the suitability or nonsuitability of each area for wilderness designation to the President by October 21, 1991. The President is then required to report his recommendations to Congress by October 21, 1993. In the interim, until Congress acts on the President's recommendations, the Secretary, through the BLM, is required to manage the designated WSAs so as not to impair the land's suitability for preservation as wilderness.

BLM conducted a study-phase analysis and presented the Secretary with preliminary recommendations on each WSA as to its suitability or non-suitability for wilderness designation by Congress. The areas considered suitable were designated multiple-use class controlled (Class C) in the CDCA Plan. The wilderness element of the CDCA Plan does not represent a final decision by the Secretary. With the adoption of the CDCA Plan, a second phase of the wilderness program commenced, which consists of a wilderness study report, whereupon the final BLM recommendations would be forwarded to the Secretary. However, since only Congress can designate an area as wilderness and until Congress acts, all land within WSAs, including those lands designated unsuitable, are managed under BLM's *Interim Management Policy (IMP) and Guidelines for Lands Under Wilderness Review* (1987).

Although the ultimate designation as wilderness can only be carried out by Congress, an indication of wilderness quality can be ascertained by reviewing the status of the four WSAs. The four WSAs were given a relative ranking by the BLM to all other WSAs in Volume B, Appendix III of the final Environmental Impact Statement and Proposed Plan for the California Desert Conservation Area. The highest ranking of the four WSAs among the 137 WSAs was for Kelso Dunes, WSA 250. The eastern portion of the WSA centered on the dunes (but excluding Broadwell Basin) was ranked 11 out of 137. WSA 256 (Bristol/Granite Mountains) was ranked 30 out of 137 WSAs, again for the eastern portion which is centered on the Granite Mountains. The eastern portion of both of these WSAs has been recommended to Congress as suitable wilderness areas. The portions within the Broadwell Basin were not recommended as suitable for wilderness designation.

Cady Mountains WSA (WSA 251) was ranked 92 out of 137 WSAs. This low ranking resulted in WSA 251 being recommend as unsuitable for wilderness designation. WSA 252, Sleeping Beauty Mountain, was ranked 130 out of 137 WSAs. It was also recommended as unsuitable for wilderness designation.

To date, Congress has not acted on the wilderness designations submitted by the BLM. Separate legislation has been introduced into Congress to address the wilderness designation issue. SB21, now termed the California Desert Protection Act of 1991, would establish wilderness designation for the Mojave Desert, including the project area. SB21 would designate most of WSA 250 (Kelso Dunes), WSA 251 (Cady Mountains), and WSA 256 (Bristol/Granite Mountains) as wilderness areas. Portions of these WSA's would also be incorporated into a Mojave National Park. WSA 252 (Sleeping Beauty Mountain) and the proposed Broadwell facilities would not be designated as wilderness in SB21.

3.12.2.3 Interim Management Policy and Guidelines for Lands Under Wilderness Review

The congressional mandate in the IMP is "not to impair the suitability of such areas for preservation as wilderness" (Section 603(c) of FLPMA, 1976). The IMP is composed of five main concepts:

- Non-impairment standard, which applies to all uses and activities except those specifically exempted from this standard by FLPMA;

- Those grazing, mining, and mineral leases that existed prior to October 21, 1976, can continue even if this would impair wilderness suitability;

- Lands under wilderness review may not be closed to appropriation under the mining laws in order to preserve their wilderness character;

- Recognition of valid existing rights; and

- Management of lands to prevent unnecessary or undue degradation (IMP 1987).

The IMP guidelines for specific activities do address land actions, which include disposals (land released from federal ownership), use authorizations, rights-of-way, access, and withdrawals. Land actions that could be applicable to the proposed project are included here in their entirety as examples of the land action guidelines of the IMP (Chapter III, Section C). Subsections of Section C are shown below within brackets.

- *Disposals.* [1]. With the exceptions provided below, lands under wilderness review may not be disposed of through any means, including public sales, exchanges, patents under the Recreation and Public Purposes Act, color of title Class II, desert lands entries (except where a vested right was established prior to October 21, 1976) or State selections.

  Disposals of the following types may be permitted under normal BLM procedures: Mining patents; color of title Class I; and desert land entries in which a vested right was established prior to October 21, 1976.

  Land exchanges may be made when BLM receives lands within an area under wilderness review, in exchange for public lands that are not under wilderness review. In very limited cases or unique situations, subject to public and Congressional oversight review, and prior approval by the Director, exchanges may be made involving public and non-Federal lands within WSAs when such action would significantly benefit wilderness values or improve wilderness management potential.

- *Use Authorizations.* [2]. Use authorizations of the following types may be permitted only if BLM determines that the case in question satisfies the non-impairment criteria and complies with guidance in the IMP applicable to the type of activity involved: Leases under the Recreation and Public Purposes Act and leases and permits under 43 CFR 2920. Any permit or lease issued under 43 CFR 2920 must contain a stipulation that if the wilderness study area is designated as a wilderness area, the lease or permit may be terminated after opportunities for a hearing, as applicable, have been taken. Provision regarding disposition of facilities, structures, and improvements upon termination will be included in the stipulations included in the permit or lease.

- *Rights-of-way.* [3]. Existing rights-of-way may be renewed if they are still being used for their authorized purpose. If necessary for normal, routine maintenance to keep an existing right-of-way facility in a safe and reliable condition, a temporary work area, temporary access route, or cross-country use of motor vehicles may be permitted as long as the activity is determined to satisfy the nonimpairment criteria. Emergency maintenance or emergency repairs may be made to protect human health and safety or to protect wilderness values, even if the activity impairs wilderness suitability. Such emergency actions must be in compliance with the policy set forth in Chapter IB11.

  New rights-of-way may be approved for temporary uses that satisfy the nonimpairment criteria. New rights-of-way may be approved for temporary or permanent uses that do not satisfy the nonimpairment criteria only under any of the following conditions:

  a. Where such access qualifies as part of the same manner and degree of "grandfathered" mineral uses and there is no reasonable, less impairing, alternative access available.

  b. In cases of valid existing rights where the BLM has determined that application of the nonimpairment standard would unreasonably interfere with the exercise of those rights. (Examples of such valid existing rights may include certain mineral leases and right-of-way authorizations in effect on October 21, 1976. In each case, the BLM's decision will depend upon the nature of the rights conveyed and the site-specific conditions involved.)

  c. In cases of non-Federal lands where the BLM has determined that application of the nonimpairment standard would unreasonably interfere with the enjoyment of the landowner's rights. In each case, the BLM's decision will depend upon the nature of the rights conveyed and the site-specific conditions involved. The BLM is required by law to provide such access as is adequate to secure to the landowner the reasonable use and enjoyment of non-Federally owned land which is completely surrounded or isolated by public lands administered under FLPMA. In determining adequate access, the BLM has discretion to evaluate such things as proposed construction methods and location, to consider reasonable alternatives (trails, alternative routes, including aerial access, and degree of development) and to establish such reasonable terms and conditions as are necessary to protect the public interest.

Reasonable use and enjoyment need not necessarily require the highest degree of access, but rather could be some lesser degree of reasonable access. The BLM, however, must provide a degree of access that is commensurate with the reasonable use and enjoyment of the non-Federal land. The BLM, however, must also consider such things as a landowner's options to develop new access across other non-Federal land or the use of existing access over non-Federal or public lands.

- *Right-of-way Corridors.* [4]. Right-of-way corridors may be designated on lands under wilderness review. However, this will in no way interfere with the wilderness review. No new rights-of-way will be approved, except under the criteria in paragraph 3 above (shown here as Right-of-way [3]). A right-of-way corridor is not an authorization, but a planning tool. The need for actual rights-of-way within a designated corridor will be considered during the wilderness study; but any recommended right-of-way inconsistent with section C3 above (shown here as Right-of-way [3]) will not be approved, unless Congress decides not to designate the area as wilderness (IMP 1987).

3.12.2.4 Motorized Vehicle Element

The motorized vehicle element of the CDCA Plan states that the vehicles are allowed on existing routes of travel and cross-country travel is prohibited.

3.12.2.5 Energy Production and Utility Corridors Element

The energy production and utility corridors element delineates three existing corridors within the project area: the northernmost is a high energy transmission line and two in the south are a joint high energy transmission line and natural gas pipeline and the other a natural gas pipeline.

3.13 PUBLIC HEALTH AND SAFETY

The major public health and safety issues associated with this project include: (1) increased public health risk from exposure to toxic substances, and (2) increased risk from potential accidents and spills. The following sections provide a discussion of potential toxic substances released from the project operations, California Air Toxic Laws, existing air toxics concentrations in the project vicinity, and the availability of emergency services to respond to accidents and spills.

3.13.1 Exposure to Toxic Substances

One of the difficult public health and safety problems is exposure to toxic substances. A toxic substance is a chemical, physical, or biological agent that interferes with life processes and may endanger human health. The adverse effects on health from exposure to toxic substances can be just as diverse as the substances themselves. Cancer is one effect of wide concern; others are birth defects, neurological damage, damage to the body's natural defense system, and other fatal diseases. Toxic chemicals may gain access to the body through inhalation, ingestion, and dermal absorption.

The area surrounding the project does not contain surface waters used for recreation or fisheries, agricultural lands, potable groundwater, or residential areas. Therefore, ingestion or dermal absorption is not considered to be an exposure pathway to the human body. Direct inhalation of evaporative emissions from the project is possible both at the project site and the nearest residential community of Ludlow, located eight and one-half miles south of the site. The remaining discussion, therefore, concentrates on airborne toxic substances.

Only in the last few years has it become known that many potentially toxic substances are present in measurable quantities in the air we breathe. Concentrations measured thus far in ambient air are less than those measured in the workplace, but have been measured at levels comparable to standards set for food and water.

Airborne toxic substances can create both immediate and long-term health effects. Sudden accidental releases of airborne toxics can create immediate and extremely serious health effects.

3.13.1.1 California Air Toxics Laws

California's air toxics law, California Health and Safety Code §44300 et seq., (AB 1807), became effective in January 1984 and defines California's air toxics program. This law created a statutory mandate for the identification and control of air toxics in California as a separate and complementary program for the control of traditional air pollutants. California's program to control air toxics includes the following actions:

- Identify toxic air contaminants;
- Determine priorities for control;
- Achieve early control;
- Promote advanced control technologies and alternative processes;
- Assist local air pollution control districts; and
- Provide a consistent level of protection throughout the state.

The air toxics law declares a clear public policy that emissions of toxic air contaminants should be controlled to levels that prevent harm to public health.

Another California toxics law is the Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65, California Health and Safety Code, §25249.5 et Seq.). This law requires the Governor of California to list chemicals known to the state to cause cancer or reproductive toxic effects.

Twelve months after a chemical is listed, people may not knowingly be exposed to significant levels without first receiving a warning. Twenty months after being listed, a chemical may not be discharged in significant amounts into any actual or potential source of drinking water.

3.13.1.2 Existing Air Toxics Concentrations

The existing concentrations of toxic air contaminants have not been measured in the Broadwell Basin area. However, some general information on ambient concentrations of benzene in rural areas is available. Benzene would be one of four specific organic compounds emitted from the Broadwell Basin Residuals Repository (see Table 4.1.7-2). Of the four compounds, benzene is the only one identified as a carcinogenic air toxic contaminant with no identified threshold exposure level under the procedures of the California air toxics law AB 1807.

Benzene is a hydrocarbon which occurs naturally in crude oil, and is formed as the oil is refined into products such as gasoline. It is emitted into the air from the marketing and burning of petroleum-based fuels and other combustion processes such as waste, agricultural, and forest management burning. The California Air Resources Board estimated that mobile sources create over 90 percent of the benzene emissions statewide, and that non-vehicular sources contribute the remaining amount. The major sources where the public is most likely to be exposed are busy roadways and service stations. Benzene is emitted from vehicles as a part of the exhaust gases as the fuel is burned and with the evaporation of fuels from the fuel system.

Exposure to benzene varies in California between urban and rural areas. Based on 1985 and 1986 ambient air monitoring data from around the state, the California Air Resources Board found that urban areas registered higher levels with annual average concentrations of about 4 parts per billion (ppb). Rural areas were found to have annual concentrations of 1.0 to 2.0 ppb. The statewide annual average was estimated to be above 3 ppb. Therefore, a probable ambient background benzene concentration for the Broadwell Basin area would be about 1.5 ppb.

3.13.2 Emergency Response Services

The proposed Broadwell Basin Repository would be located in an area with no current public services and facilities to meet emergency situations related to accidents or spills. The nearest fire protection service units are located in Newberry Springs (about 40 miles from the site), where a volunteer California Department of Forestry station exists. The nearest emergency service units (ambulance or emergency response team) and a hospital are located in Barstow. Law enforcement services in the project are provided by the sheriff's substation in Barstow, approximately one hour from the site. Traffic enforcement on all main routes is provided by the CHP.

All responses to accidental spills of hazardous wastes on public roads are managed by the State of California and local jurisdictions working in cooperation with one another. In San Bernardino

County, an Interagency Response Team has been established to respond to and clean up an accidental release of hazardous materials on public roads. The CHP has the "scene management responsibilities" for accidental spills on roads. Caltrans, the County Department of Environmental Health Services, local fire agencies, and others comprise the Interagency Response Team.

4.0 ENVIRONMENTAL IMPACTS

4.0 ENVIRONMENTAL IMPACTS

This chapter presents the results of the evaluation of the environmental impacts as a consequence of the proposed action and its alternatives, including the No-Action alternative. The impacts are analyzed for each of the 12 environmental resources described in Chapter 3.0. For each resource, direct and indirect impacts, as well as short- and long-term impacts, are described, if applicable. This is followed by an evaluation of the significance of impacts on the environment. Significance is evaluated against established criteria (presented at the beginning of each resource discussion) which are developed based on the Council on Environmental Quality (CEQ) guidelines and other environmental laws and regulations. Each resource discussion also includes recommended mitigation measures that could be implemented to eliminate or reduce adverse impacts to the extent possible, followed by the identification of unavoidable significant impacts.

In addition, a discussion of cumulative impacts of approved, proposed, or reasonably foreseeable projects in the vicinity of the Broadwell Basin Residuals Repository site is included in this chapter. Impacts initially determined not to be significant and not discussed in detail in this chapter are addressed in the initial study (see Appendix A).

4.1 IMPACTS OF THE PROPOSED ACTION

4.1.1 Geology

The impacts of the proposed action on the geology of the area are mainly those on mineral resources. There is no reason to believe that any other geological conditions or processes would be affected by the action. However, the project facilities may be affected by geologic hazards if proper engineering practices are not followed.

4.1.1.1 Criteria for Significance of Impact Determination

An impact was considered significant if one or more of the following conditions would be met:

- New facilities are exposed to geologic hazards, e.g., active faults, subsidence, liquefaction, slope stability, and seismic shaking, that require special consideration in final engineering design; and
- New facilities preempt exploration and production of strategic or other important mineral resources from the project site.

4.1.1.2 Impacts

Active Faulting. The detailed site geology reconnaissance by Rasmussen and Associates (available as a technical appendix to this document) determined that the project site is not located within 200 feet of an active fault and, therefore, the site is not subject to ground rupture due to local faulting. Based on the magnetometer survey and the extensive surveys of the area, no active faults are located in the general vicinity of the proposed Repository site; that is, within Section 25. The Ludlow Fault was given intensive consideration during the reconnaissance and Rasmussen (based on the magnetometer survey) concluded that it is farther west of the project site than shown on existing maps and that it is not active in the vicinity of the site. This was based on the lack of surficial evidence of faulting to the west of the playa in Quaternary-age materials. Regardless of whether the fault has strike-slip or dip-slip characteristics, the offsets would have been observable in the field, and no surface rupture features were identified.

Rasmussen's investigations of the Broadwell Lake Fault, and his review with the individuals that identified its existence, concluded that this fault is not active. The evidence indicates it cannot be traced as far northwest as Broadwell Lake. The closest location identified from satellite photographs is located about eight miles southeast of the project site.

Rasmussen's investigation considered other geologic hazards at the site and concluded that regional ground shaking, subsidence, and desiccation cracks are the only hazards that may affect the proposed project. These issues are addressed below. The potential hazards eliminated from further consideration included volcanic hazards, liquefaction, and slope stability. (See details in the Rasmussen and Associates geologic study available as a technical appendix.)

Seismic Shaking. As noted above, the available data demonstrate that the site is not subject to the ground rupture hazards from nearby faults. The nearest fault of importance is considered to be the Cady Fault, which may be active. It is located approximately eight miles to the northwest. Other active faults include the Manix Fault, located approximately 14 miles northwest of the site, and the Pisgah Fault, located 15 miles to the southwest. Based on the earthquake history of these faults, other faults, and recorded epicenters in the region, Rasmussen made a general forecast (to be used for planning purposes) of the maximum ground accelerations that can be expected at the project site (Table 4.1.2-1). According to Rasmussen, "Moderate seismic shaking of the site may occur during the lifetime of the proposed development."

Thus, the potential ground shaking hazards should be considered significant at this location and mitigation must be implemented to ensure that damage does not cause significant adverse impacts to the Repository or the structures constructed in support of disposal activities.

Table 4.1.2-1

Maximum Credible Earthquakes and Ground Accelerations from Cady, Manix, and Pisgah Faults in the Vicinity of Broadwell Basin Residuals Repository

Fault	Closest Distance (miles)	Direction	Maximum Credible Earthquake	Maximum Ground Acceleration	Maximum Probable Earthquake	Maximum Ground Acceleration
Cady	8	NW	6.7	0.22g	6.3	0.18
Manix	14	NW	6.7	0.13g	6.3	0.10g
Pisgah	15	SW	7.0	0.15g	6.5	0.11g

Subsidence. Subsidence is generally associated with the extraction of large volumes of groundwater. With rapid dewatering of underlying aquifers, the basin sediment could begin to subside and create surface cracks and cracks in the Repository. This could cause the Repository to lose integrity and release leachate or waste into the environment.

To address this issue, a water production well was drilled in the eastern portion of Section 25 and was flow tested while many non-production wells in the basin were monitored. Brown and Caldwell utilized the well pumping and monitoring data to model the consequences of pumping water to meet both short- and long-term water supply requirements of the facility.

Based on the model results, the short-term effect of providing water at a rate of 275 gallons per minute (gpm) during the first year of construction indicated that the drawdown of the groundwater table beneath the Broadwell playa would be about 0.2 foot. The long-term model results (based on an assumed 50 gpm of production) indicated that the groundwater table beneath the playa would experience <0.02 foot of drawdown. Based on these model forecasts, the potential for subsidence is very low to non-existent.

Although the potential for subsidence is forecast to be nonsignificant, it is judged appropriate to monitor the ground elevation as a source of information for the long-term management of the proposed Repository (see mitigation measure G-3 in Section 4.1.1.3).

Desiccation Cracks. The most significant factor of rapid geologic change is that of the desiccation cracks. The proposed facility lies in an area where the presence of desiccation cracks has been determined. References can be found, however, to the "annealing" or "healing" of the cracks. Because the cracks are merely infilled, they cannot be thought of as healed in the sense of a coherency or strength having been achieved across them. The filled fissures are not strengthened but are instead susceptible to reopening as the next desiccation cycle proceeds. Excavation and backfilling of a fissure with impermeable clays will not necessarily prevent the pulling apart of the fissure, possibly at the edge of the backfilled part, in response to stresses set up in the drying sediments laterally from the fissure.

The placement of the three-foot-thick layer of saturated clay secondary liner, overtopped with an impermeable high density polyethylene (HDPE) flexible membrane liner, would significantly control the moisture content of the underlying playa in perpetuity and thus prevent future desiccation cycles. The controlled moisture content under the Repository liner system would also halt the progression of possible new cracks extending across the exposed lake surface up to the Repository.

The sudden opening of large desiccation cracks has caused severe problems in other dry lake beds in the Mojave Desert. These problems have included road damage, damage to aircraft landing strips, sudden draining of reservoirs, and destabilization of electric transmission line tower supports (Fife 1980). These occurrences, however, were coupled with significant water basin demand and associated drawdown. For example, the damage to aircraft landing strips at Edwards Air Force Base is associated with severe water withdrawal from that basin, resulting in 180 feet of water table drawdown and an accompanying three and one-half feet of lakebed subsidence (Edwards Air Force Base 1991).

A review of historical aerial photographs indicates that no new desiccation fissures have formed at Broadwell Lake since 1954. Furthermore, the character of the desiccation fissures observed in the 1954 aerial photographs indicates that the fissures had already been in existence for many tens, or perhaps hundreds, of years. Consequently, it is likely that the desiccation processes acting at Broadwell Lake have reached equilibrium and that previous episodes of playa cracking have relieved the accumulated tensile stresses. Therefore, the probability is low for development of new desiccation fissures at Broadwell Lake.

Although unlikely, if it were to occur, the opening of a large fissure under the proposed Repository could possibly cause failure of the overlying Repository liner. Note that liner designs commonly address comparable liner-integrity issues, such as that needed to accommodate settling, consolidation, and compressibility of the underlying soils. Entry of leachate or solid hazardous waste into an opened crack would result in downward movement of these materials, with possible subsequent transport to the groundwater. Opening of a fissure could potentially also cause breaching of the berm surrounding the modules or damage to the leachate collection system (it could not affect treatment facilities or other parts of the facility, because these are all located off of the playa surface). The opening of a desiccation fissure, therefore, could result in a significant impact.

The major mineral resources at the project site are aggregate and clay, which are abundant in the vicinity of the project area. Therefore, no significant adverse impacts are expected on the mining of these resources. The Bureau of Land Management (BLM) has classified Broadwell Lake and its margins as "prospectively valuable" for sodium. However, there does not appear to be recoverable quantities of sodium salt on the playa surface; therefore, impacts are not considered significant.

In summary, geologic impacts are considered to be significant because of the possibility of the opening of desiccation cracks and possible seismic shaking that would result in damage to the Repository liner.

4.1.1.3 Mitigation Measures

G-1. The applicant shall design the facility to withstand the forecasted ground shaking. The County shall review and approve this design and ensure that it is properly implemented.

G-2. The applicant shall install monuments to monitor subsidence. The location and frequency of monitoring the monuments shall be identified in a report that shall be submitted to the County Geologist and Surveyor for review and approval. The applicant shall implement the approved subsidence monitoring program and provide periodic reports to the County for review and retention.

G-3. The applicant shall design the Repository to (1) control the moisture content of the near-surface playa sediments to preclude initiation or propagation of new or existing desiccation cracks; (2) control surface water on the playa; (3) provide a subgrade foundation for the Repository that possesses uniform strength and physical properties to minimize bearing-capacity failures or differential settling; and (4) provide a liner system that satisfies the minimum subgrade permeability requirements of Chapter 15 (1×10^{-7} cm/sec). The County shall review and approve this design prior to implementation and ensure the plan is implemented as approved.

4.1.1.4 Significant Unavoidable Adverse Impacts

Engineering design solutions suggested as mitigation measures would isolate the Repository and reduce the potential damage from desiccation cracks to a level of nonsignificance.

4.1.2 Soils

4.1.2.1 Criteria for Significance of Impact Determination

Impacts on soils were considered significant if:

- Project-induced water erosion displaces topsoil at a rate greater than natural erosion; and
- Exposure of loose soil to wind erosion results in air quality degradation unacceptable to regulatory agencies.

4.1.2.2 Impacts

The proposed action entails the construction of a Specified Hazardous Waste Facility within the dry Broadwell playa. As part of the construction details, a clay liner would be constructed beneath the Repository. This requires the excavation of native clay soil from the clay borrow area adjacent to the proposed site location. Coarse alluvial material would be quarried from an area north-northwest of the proposed site location. This material would be used in the upgrading and realignment of Crucero Road, which connects the proposed site location to Interstate 40 and Ludlow; construction of the Repository berm; and for use in the Repository operations.

A total of 977 acres would be disturbed by the construction of the proposed facilities. The construction of the Repository would disturb 316 acres, while the two borrow areas would disturb 363 acres and 227 acres for the coarse material and clay materials, respectively. An additional seven acres would be disturbed by widening the dirt road to the coarse material borrow area and 64 acres by improving the existing Crucero Road.

As result of creating the two borrow areas, soil erosion could cause an impact if materials were allowed to be blown from the site or removed by runoff. With a pit-shaped borrow area design, materials may erode to the bottom of the pit where they can be removed in the normal process of mining out further soil resources. Any material that is removed from the two borrow areas and blown away would tend to be fine-sized materials. This would increase the dust concentration in the project vicinity resulting in air quality deterioration.

For the Repository, berms would be constructed to protect against flooding. These berms would be 35 feet high, 230 feet wide, and 14,500 feet long. As the sides would be stabilized by a concrete-type material, the potential for wind erosion from these berms is greatly reduced.

Improvement of Crucero Road may have the potential to create windborne sediments. The coarse alluvium would be used to improve the roads and asphalt would be layered on top. As a result, wind erosion would be minimal during the construction and use of the improved roads.

Overall, the soil erosion impacts associated with excavated and stockpiled soils would be adverse but not significant.

4.1.2.3 Mitigation Measures

S-1. To maintain the integrity of the Repository, the subexcavated bottom shall be scarified to a depth of 12 inches. The scarified clayey soil shall then be brought to a near optimum moisture content and recompacted to a relative compaction of at least 90 percent (American Society of Testing Material 1:557-70). Clayey materials used shall have a uniform moisture content. The granular alluvial materials used for road construction and the Repository shall be brought to near optimum moisture content and placed in eight-inch or less lifts.

S-2. Road construction and improvement shall serve as a source of sediments and wind-blown erosion. This shall be mitigated by watering or use of chemical suppressant over the exposed surface until the asphalt surface is applied.

S-3. Erosion caused by flash floods shall be averted by installing drainages or berms to divert water flow from the road.

S-4. When all the borrow material has been extracted from the proposed coarse borrow site, the excavated quarry shall be reshaped, smoothed, and stabilized. The disturbed areas around the quarry shall be reshaped and revegetated to prevent sheet erosion from flash flooding and wind-blown sediments.

S-5. The road to the coarse material borrow area north-northwest of the proposed site shall be reshaped and restored to near natural conditions after all the coarse alluvium required has been removed. All disturbed areas along the road shall be reclaimed in accordance with the County and the BLM standards.

S-6. To reclaim the borrow area, the applicant shall fully implement a reclamation plan as approved by the BLM and the County of San Bernardino. The applicants' proposed reclamation plan has been submitted to the County under Surface Mining and Reclamation Act (SMARA).

4.1.2.4 Significant Unavoidable Adverse Impacts

With the implementation of the above-mentioned mitigation measures, soil erosion impacts from wind and flash flooding would not be significant. However, some erosion during construction is unavoidable.

4.1.3 Hydrology

Because the proposed Repository is to be a Class I Repository for hazardous wastes, the possible impact on the hydrologic environment (surface and groundwater resources) is an important consideration.

4.1.3.1 Criteria for Significance of Impact Determination

An impact was considered significant if one or more of the following conditions occur:

- **The Repository is not underlain by natural geologic materials that have a permeability of not more than 1 x 10^{-7} centimeters per second (as required by Title 23, Sub-Chapter 15 of the California Code of Regulations) and that are not of sufficient thickness to prevent vertical movement of fluid, including waste and leachate, from the Repository to waters of the state;**

- **The Repository and support facilities are not protected from inundation by 100-year floods;**

- **The Repository cells are not protected from inundation from the probable maximum precipitation (PMP) event; and**

- **The Repository and support facilities are not designed and constructed to contain the waste, including leachate, and prevent its escape into the environment outside of the facilities.**

4.1.3.2 Impacts

This section addresses two types of potential hydrological impacts. The first hydrology issue of concern is the potential for facilities to be inundated by floods within the basin. The second hydrology issue is the potential for contamination of groundwater resources as a result of hazardous wastes escaping from the Repository or other facilities at the project site. The normal rainwater falling on the Repository and the treatment/storage areas would be collected through a leachate collection system and directed to the evaporative tank. No impacts on hydrological resources are anticipated from this activity.

The detailed hydrology assessment of the whole Broadwell Basin was prepared by Bryan A. Stirrat and Associates (1990), and the flood hazards to the facility were evaluated in a 1990 report by Brown and Caldwell. The investigations concluded that the proposed project site would be exposed to inundation from two types of flood hazard events. The drainage from the alluvial fan west of Section 25 would generate surface flows sufficient to flood the proposed access road and the support facilities located west of the Repository (see Section 2.2, Figure 2.2-3). Because of the protective berm that would be constructed around the Repository (35 feet high, refer to Section 2.2, Table 2.2-1), potential for surface flows from the alluvial fans to the west to breach the berm is negligible.

Aside from the potential damage to facilities, the potential flood flows could incorporate hazardous wastes of materials stored in the facilities and cause the accidental release of hazardous waste into the surface environment in Broadwell Basin. This is a potentially significant adverse impact that can be mitigated.

The hazards from storm flows originating on the alluvial fan to the west can be mitigated by intercepting the surface flow with an adequate-sized diversion berm or dike and diverting flows around the support facilities and the Repository on the Broadwell dry lake bed. The berm required to protect the facilities would be similar to the flood control berms constructed to protect the interstate highways in the desert. It is anticipated that a berm approximately 10 to 13 feet high would be required to protect the facilities from inundation by the 100-year flood. This berm would be constructed west of the facilities in Section 25 in a northwest-southeast alignment. Intercepted flows would be carried in a channel that would be carved by the diverted flows along the outside of the flood protection berm to Broadwell dry lake bed. Because this would have been the ultimate destination of the flows, no adverse environmental impact is forecast to be caused by the flow diversion and the point of entry onto the lake bed.

The project facilities would also be exposed to a second type of flood inundation at the site selected. When flood runoff accumulates on Broadwell dry lake bed, the standing water would be higher than the base elevation of the Repository. Figure 3.4-2 (Section 3.4) depicts the standing water elevation resulting from the 100-year storm event (as defined in San Bernardino County's Hydrology Manual) and from the PMP event (as defined in federal guidelines, see Brown and Caldwell's report available as a Technical Appendix for more detail). The 100-year stormwater elevation on the lake bed is forecast to be 1,307 feet (approximately 11 feet above the lake bed elevation of 1,296 feet) and the PMP stormwater elevation on the lake bed is forecast to be 1,321 feet (approximately 25 feet above the lake bed elevation).

The project site would be inundated from either of these floods, which is considered a significant adverse impact. The project design includes a 35-foot berm completely surrounding the Repository. This elevation was selected to protect against the PMP flood and to provide an additional 10 feet of freeboard (elevation between the maximum water level and the top of the berm) to protect against storm-generated waves. The exterior of the berm would be armored to prevent wave erosion from causing significant erosion of the berm. These are design elements of the facility, so no additional mitigation measures are required to protect the Repository from significant flood hazards.

The support facilities would be protected by a berm designed to exclude the 100-year flood elevation with adequate freeboard (15 feet of berm). This means that if a PMP event (as series of storms) were to occur over the life of the facility, the support facilities would be flooded. Under these circumstances, any wastes contained in the support facilities (the treatment facility or the curing area) could escape into the flood waters. Because a PMP requires several days to occur, the proponent has proposed that if the water elevation nears the 100-year stormwater elevation, all hazardous waste contained in the support facility areas would be collected and transferred into the Repository.

Implementation of this measure would eliminate the potential to release hazardous materials into the surface water. Because the specific means of implementing this measure are not defined, mitigation measure H-2 in Section 4.1.3.3 has been established to ensure that the potential for release of hazardous materials into flood waters is eliminated.

Implementation of the mitigation measures can reduce the potential hazards from the 100-year flood below a significant level by eliminating any threat to the proposed Broadwell facilities. The support facilities could be inundated from a larger flood, but no hazardous wastes would be released into the stormwater based on implementation of the recommended mitigation measure. The Broadwell Corporation would be responsible for all personnel and visitors to be relocated to the Repository or removed from the area in the event of a flood greater than the 100-year accumulation on the dry lake bed. After mitigation, the potential flood hazard impact is considered nonsignificant.

The second hydrology issue of concern is the potential for groundwater contamination. The potential exists for the escape of hazardous material, in the form of either leachate or solid waste, from the Repository, including the modules, treatment area, or any other place where the waste is handled or stored. Hazardous material can escape through spills, leaks, or rupture of the liner.

One possibility for accidental release could occur during handling of the waste at the facility. Because all hazardous wastes delivered to the facility would be solid, the potential for transmittal to the groundwater table is very low. However, to ensure that residual materials are not left in the soil where they can be transported to the groundwater, a mitigation measure would be required. Mitigation measure H-3 in Section 4.1.3.3 is recommended for this purpose.

Another possibility for escape of material from the Repository is that leachate could escape through the four liners (see Chapter 2.0) and ultimately enter the groundwater table below the project site. Releases from the Repository could reach the groundwater table beneath the Repository through slow flow through the lake bed clays or more quickly through a desiccation crack. The issue of desiccation cracks and the methods for preventing their occurrence beneath the Repository have been addressed in Section 4.1.1. The mitigations recommended for control of desiccation cracks beneath the Repository are adequate to substantially reduce the probability of this occurrence.

The quadruple liner system with the clay foundation proposed for the facility provides an adequate engineered system to prevent releases of leachate, through both system redundancy and through early detection and correction of a leak before it passes through one liner. However, assuming that a significant leachate release did occur, even with all of the above engineered systems, would the impact of such a release be significant? The tests of groundwater beneath the Repository indicated a range of Filterable Residue (total dissolved solids) from 120,000 milligrams per liter (mg/l) to 26,000 mg/l (Brown and Caldwell, June 1990, Table 4-5; a copy of this study is in the Technical Appendices). The highly degraded quality of the groundwater beneath the Repository makes the water unusable for most uses. A release of leachate, therefore, would not cause significant degradation to groundwater resources with any potential uses based on the data available. No other wells extract groundwater within this portion of the Broadwell Basin; therefore, no potential exists to affect other users of the basin's groundwater. If a regulatory agency were to conclude that any degradation of groundwater is considered unacceptable or significant, the applicant can be required to cleanup groundwater that has been demonstrated to be contaminated by leachate. Mitigation is provided below to require treatment to return groundwater to acceptable contamination levels under such circumstances (see mitigation H-3 in Section 4.1.3.3).

Another water pollution issue of concern is the potential for contaminated groundwater migration out of Broadwell Basin. As noted in Section 3.4.1, the literature indicates that groundwater may migrate to the north through the pass between the Cady and Bristol mountains into the Soda Lake Basin (the apparent sink for the Mojave River).

Extensive groundwater data have been obtained from Broadwell Basin. The goal of drilling several observation wells has been to characterize the groundwater aquifer in Broadwell Basin. Figure 3.4-1 (Section 3.4) presents the groundwater elevation data obtained for the Broadwell Basin. The elevation data in Figure 3.4-1 clearly demonstrate that, under present conditions, Broadwell Basin is a closed basin; that is, all water flows to the center of the basin, which is the lowest point in the groundwater table. The 1,190-foot groundwater elevation contour closes within the basin, but the 1,200-foot elevation does not. The elevation difference between the lowest point on the north end of the lake (observation well EP-2, 1,184.99 feet), and the observation well in the middle of the pass between the two basins (EP-8, 1,195.52 feet), is 10.5 feet.

Under current circumstances, any release of leachate from the facility would flow south to the lowest groundwater elevation (EP-7, 1,179.16 feet) in the basin (see Figure 3.4-1). Therefore, the potential for the leachate to migrate from the groundwater aquifer which lies beneath Broadwell dry lake does not currently exist. The impact of any release under these circumstances would not be significant and would not cause degradation in any other basin.

A concern has been expressed about the potential changes in future groundwater elevation that could result in the gradient being reversed and groundwater flowing north through the pass into Soda Lake Basin. The only human activity that would affect groundwater levels within the basin is water extraction in support of the proposed project. This activity is forecast to marginally lower the groundwater table (refer to Section 4.1.8) beneath the lake bed. Lowering the groundwater table would increase the hydraulic gradient (direction of natural flow) into the basin and reduce the potential for water flow into Soda Lake Basin.

The project is designed to minimize the potential for any releases of hazardous wastes into the environment. The four liner and leakage detection systems are expected to ensure that any accidental releases can be managed without causing a significant impact. Another layer of protection can be added by installing a groundwater monitoring system which provides additional warning of any releases from the Repository. Mitigation measure H-4 requires the installation of such a monitoring system.

With the monitoring systems and the natural internal drainage, the potential adverse impact to groundwater quality from operating the Broadwell Basin Repository is considered nonsignificant.

4.1.3.3 Mitigation Measures

H-1. The applicant shall submit the engineering drawings and supporting storm runoff data for the design of the flood protection berm to be located in Section 25, west of the Broadwell Basin Repository facilities. The County shall review and approve the flood protection berm design and construction plans prior to initiating construction of any facilities in Section 25. Prior to occupancy or use of any facilities, the flood protection berm shall be constructed and approved by the County.

H-2. The applicant shall provide the Department of Environmental Health Services with an internal waste relocation plan to be implemented when stormwater on the lake bed reaches an elevation of 1,305 feet. This plan shall require termination of all deliveries to the project site and provide for transfer of all hazardous materials from the support facility area into the landfill. The equipment, manpower, and time required to accomplish the relocation under maximum storage conditions shall be defined in the plan. This plan shall be submitted to the Department of Health Services and the Lahontan Regional Water Quality Control Board for review and approval prior to receiving any waste for disposal.

H-3. The proponent shall prepare a plan to cleanup any accidental release of hazardous waste or material at the Broadwell Basin Repository facilities. This plan shall include the equipment that will be used to respond to the spill, the manpower available to respond, the response time frames, the method of verifying the cleanup has been effective, and the incident reporting procedure that will be used to document each accidental spill. The plan shall be submitted to the Department of Environmental Health Services for review and approval prior to receipt of any hazardous waste at the facility.

H-4. The applicant shall submit a monitoring program for establishing the long-term water quality of the groundwater beneath the Repository. This monitoring program shall include samples from locations around the perimeter of the Repository in accordance with requirements from the Regional Water Quality Control Board. This plan shall be completed and approved by the Board and the monitoring system components installed prior to receipt of any wastes. If the monitoring program detects any changes in water quality attributable to the Repository, the proponent shall treat the groundwater in accordance with regulatory requirements and return it to the level of quality required by these agencies.

4.1.3.4 Significant Unavoidable Adverse Impacts

The design of the facility and the implementation of suggested mitigation measures will reduce the possibility of groundwater contamination to a minimum and to nonsignificant levels.

4.1.4 Noise

4.1.4.1 Criteria for Significance of Impact Determination

An increase in noise was considered significant if one of the following conditions would occur for an extended period of time:

- If the noise levels related to traffic exceed the San Bernardino County Noise Element standard (L_{dn}) of 65 decibels (dB); and
- If the noise levels at the nearest sensitive receptor exceed the San Bernardino County Noise Element standards (Section 3.5, Table 3.5-1).

4.1.4.2 Impacts

The Broadwell Basin Residuals Repository would consist of an access road, entrance area, a waste treatment area, a waste repository, and clay and coarse borrow areas. Operations and corresponding noise generation are addressed separately for each of these facility components. No night-time operations are proposed except during an emergency.

Heavy Equipment Noise Levels. Construction and operation of the Repository facility would require the use of various types and sizes of heavy equipment including scrapers, bulldozers, compactors, graders, water trucks, loaders, and haul trucks. Maximum noise levels for these types of heavy equipment are provided in Table 4.1.4-1 and are used throughout this analysis in the assessment of noise impacts.

Access Road and Interstate 40 Noise Levels. The project proponent has reported that project-generated daily traffic to and from the facility would consist of approximately 200 heavy trucks and 50 passenger vehicles per day. The Federal Highway Administration model was used to assess the noise level increase of the additional traffic on the project access road and on Interstate 40.

Project-related traffic would result in a 0.3 dB increase in L_{dn} noise levels on Interstate 40 and an L_{dn} of 57 dB at a distance of 100 feet from the access road centerline. The 0.3 dB increase on Interstate 40 would be imperceptible. Although the increase in traffic noise levels along the access road would be clearly noticeable, the predicted L_{dn} values at the nearest residential dwellings would be within acceptable limits of 65 dB as defined by the County Noise Element.

Table 4.1.4-1

Heavy Equipment Noise Levels

Equipment	Approximate Equipment Rating or Capacity	Approximate Range of Engine Power Rating (hp)	Estimated Range of Max Sound Level L_{MAX} (dBA at 50 ft)
Dozers	251 - 700 hp	251 - 700	85 - 90
Front-end Loaders	6 - 15 cu yd	300 - 750	86 - 90
Self-Propelled Scrapers	10 - 15 cu yd	150 - 300	83 - 86
	16 - 24 cu yd	301 - 550	86 - 88
	25 - 40 cu yd	551 -1000	88 - 91
	(Blade width)		
Graders	9 - 12 ft	60 - 175	79 - 83
	13 - 16 ft	176 - 350	83 - 86
	17 - 20 ft	351 - 600	86 - 89
Off-Highway Haulers	15 - 28 ton	150 - 300	83 - 86
	30 - 58 ton	301 - 500	86 - 88
	60 -115 ton	501 - 800	88 - 90
	120 -300 ton	801 -2000	90 - 94
	(Wt. w/ Ballast)		
Steel Rollers	3 - 5 ton	25 - 55	75 - 78
	6 - 11 ton	56 - 89	78 - 80
	12 - 24 ton	90 -110	80 - 82
Trucks	100 - 200 hp	100 - 200	81 - 84
	201 - 400 hp	201 - 400	84 - 87

Source: Miller & Hoover 1981.

A short-term increase in noise would occur during the construction and improvement of the access road, but impacts are not considered significant at existing noise-sensitive land uses.

Entrance Area. The entrance area would consist of an office building, laboratory, sampling station, gatehouse and truck scale, parking area, and hauler's rest area. Trucks idling in the vehicle parking area that are awaiting chemical confirmation testing are predicted to be the only potentially significant noise source in the entrance area.

During peak hour plant operations, approximately 20 heavy trucks could be idling in the vehicle parking area. Typical average L_{eq} noise levels for idling trucks range from 65 to 70 decibels on the

A-weighted scale (dBA) at a distance of 50 feet. With 20 trucks idling at a time, the 55 dBA noise contour (L_{eq}) would be approximately 1,250 feet from the vehicle parking area.

Noise levels resulting from entrance area construction and operation are not predicted to be significant at existing noise-sensitive land uses, approximately eight miles from the entrance area.

Treatment Area. The treatment area consists of a trailer transfer area and traffic pad, two waste receiving and storage buildings, various inorganic stabilization and treatment units, a silicate storage and mixing area, additive storage areas, and treated waste stockpile and curing areas.

Vehicles carrying waste requiring treatment would access the treatment area and proceed to the appropriate tipping stall to deposit their load. The deposited waste would be transported to the feed hoppers in the building with rubber-tired loaders. Oversized particles would be screened before being conveyed to the feed hoppers. Waste entering the feed hoppers would be conveyed to the treatment units for processing. Once processed, the waste would be transferred to an adjacent, lined outdoor curing area.

Potentially significant noise levels could result from the dumping and screening process, loaders, bulldozers, dump trucks, miscellaneous diesel equipment, and conveyers. Because the waste treatment is a chemical process, noise levels resulting from this process are not expected to be significant relative to the mechanical operations in the treatment facility.

Because operations at the treatment facility range from completely enclosed to completely exposed, the exact noise generation of the facility cannot precisely be determined. If the bulldozer and two dump trucks were outside of the treatment building facility operations, the 55 dBA noise contour (L_{eq}) for that equipment could be approximately 1,000 feet from the treatment facility area. A maximum noise level of 85 to 90 dBA could be expected at a distance of 50 feet from the equipment.

Maximum noise levels resulting from treatment facility construction and operation are predicted to be less than 35 dBA and therefore insignificant at existing noise-sensitive land uses in Ludlow.

Waste Repository. The Repository cells would be developed initially at the southeastern corner of the Repository site in Section 25. A perimeter berm would enclose the Repository cells to protect the waste fill from the maximum precipitation flood event at the project site. The Repository cell would be lined and filled starting at the south end and progressing to the north. As the cells are developed, the flood protection berms would be extended and the liner system installed one cell ahead of the active Repository cell.

Construction and operation of the Repository cells would require scrapers, graders, haul trucks, water trucks, compactors, front loaders, and related heavy equipment. The maximum noise levels expected for these types of equipment are shown in Table 4.1.4-1. Noise from heavy equipment operating within the Repository cells would be reduced by the surrounding flood berm. The 55 dBA noise contour (L_{eq}) for equipment used in the Repository liner construction would be approximately 4,000 feet from the operating equipment.

Noise levels resulting from Repository cell construction and operation are not predicted to be significant at existing noise-sensitive land uses eight miles to the south.

Borrow Areas. Clay and coarse borrow pits would be excavated to provide materials for construction and operation of the Repository. The number of scraper loads per day from the clay borrow pit to the fill area is reported to be 150 during construction and only two during normal operations. The number of coarse material truckloads from the coarse borrow area to the Repository site is approximately four during operations. Scrapers, bulldozers, and loaders would be used in the borrow excavation areas. Heavy equipment used in the borrow areas would operate 10 hours per day.

Noise levels resulting from borrow pit excavation and transfer of excavated materials to the Repository would be significant in the vicinity of the borrow areas. Maximum noise levels of 85 dBA would be expected within 50 feet of the operating equipment. The 55 dBA contour (L_{eq}) for borrow pit activity would be approximately one mile from the borrow pits.

Noise levels resulting from borrow excavation are not predicted to be significant at existing noise-sensitive land uses more than eight miles to the south.

Summary of Proposed Action Impacts. Because of the distance of the project site to the nearest residences, none of the Broadwell Basin Residuals Repository facilities would exceed the County's 55 dBA standards (L_{eq}). The 55 dB contour (L_{eq}) around the site is a circle centered on the site with a radius of about 2 miles. The contour represents all facility components operating simultaneously and, therefore, represents worst-case operating conditions.

Notwithstanding the County's land use compatibility requirements with respect to noise, the project would substantially increase noise levels in an area that currently is exposed to very low noise levels most of the time. People in the vicinity of the project pursuing recreational activities may hear noise from the facility and may feel that the noise detracts from their recreational experience. The approximate limit of audibility from the Repository site, assuming all components operating simultaneously, is about four to five miles. Estimating the suitable range of noise is a problematic task. The audible range would vary with the level of sound generated at the facility, meteorological conditions, background noise levels, and the acuity of an individual's hearing.

However, even with these limitations, an attempt has been made to estimate the limits of audibility based on normal noise attenuation of approximately six dBA for each doubling of distance. The 55 dBA noise contour and a contour depicting the approximate limit of audibility from Repository facility operations are depicted in Figure 4.1.4-1. The noise contours represent daytime noise levels

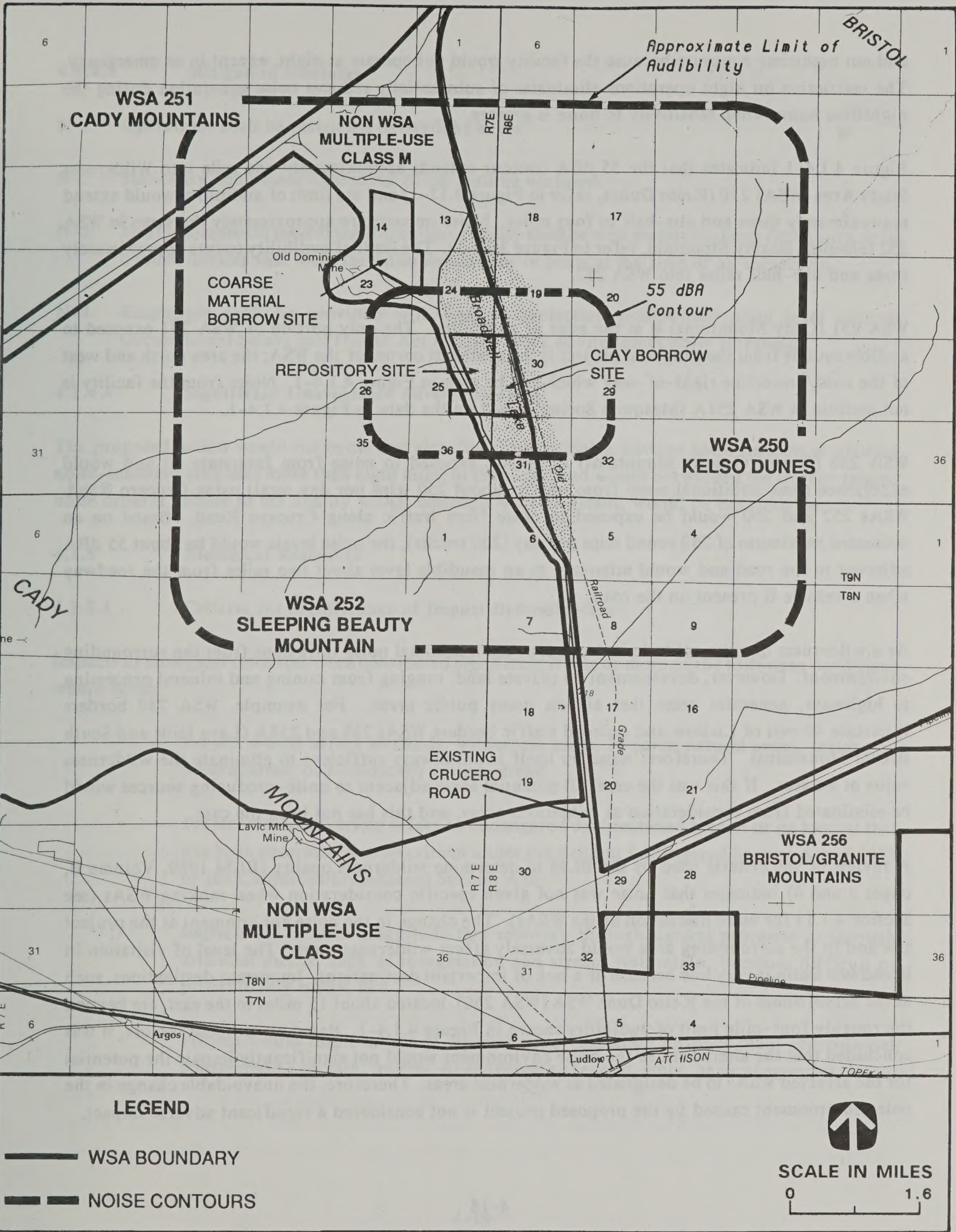


Figure 4.1.4-1 Noise Contours and Audible Sound Contour Centered on Broadwell Basin Residual Repository Site

and not nighttime exposure because the facility would not operate at night, except in an emergency. The restriction on night operations eliminates or substantially reduces noise generation during the nighttime hours when sensitivity to noise is greater.

Figure 4.1.4-1 indicates that the 55 dBA contour extends approximately one mile into Wilderness Study Area (WSA) 250 (Kelso Dunes, refer to Figure 3.12-1) and the limit of audibility would extend approximately three and one-half to four miles. Noise impacts are approximately the same in WSA 252 (Sleeping Beauty Mountain, refer to Figure 3.12-1). The limit of audibility occurs approximately three and one-half miles into WSA 252.

WSA 251 (Cady Mountains) is at the edge of audibility. The only portion of WSA 251 exposed to audible sounds from the proposed project is the southeast corner of the WSA; the area north and west of the road/powerline right-of-way which can be seen in Figure 4.1.4-1. Noise from the facility is not audible in WSA 251A (Mesquite Spring) based on the data in Figure 4.1.4-1.

WSA 256 (Bristol/Granite Mountains) is already exposed to noise from Interstate 40 and would experience some additional noise from traffic (about 250 trips per day total) using Crucero Road. WSAs 252 and 250 would be exposed to noise from traffic along Crucero Road. Based on an estimated maximum of 250 round trips per day (200 trucks), the noise levels would be about 55 dBA adjacent to the road and would attenuate to an inaudible level about two miles from the roadway when a vehicle is present on the road.

As a wilderness quality, solitude is dependent upon minimal noise intrusions from the surrounding environment. However, development on private land, ranging from mining and mineral processing to highways, generates noise that affects many public areas. For example, WSA 250 borders Interstate 40 east of Ludlow and railroad traffic borders WSAs 258 and 258A (Lava Hills and South Bristol Mountains). Therefore, noise by itself is not always sufficient to eliminate the wilderness value of an area. If this was the case, all potential areas adjacent to noise-producing sources would be eliminated from consideration as wilderness areas, and this has not been the case.

A review of the criteria used by the BLM to determine wilderness quality (BLM 1980, Volume B, pages 3 and 4) indicates that noise was not given specific consideration when ranking WSAs (see Section 4.1.11 for more discussion of the WSAs). The change in the noise environment at the project site and in the surrounding area would adversely affect wilderness users. The level of visitation in Broadwell Basin is very low because of a lack of important destinations. Important destinations, such as the actual dunes of the Kelso Dune WSA (WSA 250), located about 15 miles to the east, are beyond the roughly four-mile limit of audibility shown in Figure 4.1.4-1. Based on all these factors, it was concluded that the alterations in the noise environment would not significantly impair the potential for the affected WSAs to be designated as wilderness areas. Therefore, the unavoidable change in the noise environment caused by the proposed project is not considered a significant adverse impact.

4.1.4.3 Mitigation Measures

N-1. Operations shall be restricted to daylight hours.

N-2. Stationary equipment exceeding 70 dB shall be enclosed.

N-3. Heavy equipment used at the Repository facility shall be well maintained and fitted with noise control devices that meet the noise regulations in place at the time of an inspection.

N-4. Employees shall be provided with hearing protection gear where noise level exceeds Occupational Safety and Health Act (OSHA) work environment noise thresholds.

4.1.4.4 Significant Unavoidable Adverse Impacts

The proposed action would not cause any significant unavoidable adverse noise impacts at existing noise-sensitive land uses more than eight miles to the south, and would not exceed the traffic-related noise criteria. Noise in the nearby WSAs, although not significant, would be unavoidable.

4.1.5 Biological Resources

4.1.5.1 Criteria for Significance of Impact Determination

Impacts to biological resources were considered significant if one or more of the following conditions would occur:

- Project would affect wetlands, wilderness areas, research natural areas, designated natural areas, or ecologically critical areas;
- Project would adversely affect an endangered or threatened species or its habitat that has been determined to be critical under the Federal Endangered Species Act of 1973 or the California Endangered Species Act;
- Impacts are of such magnitude that recovery through natural processes or through artificial means, such as revegetation and stream restoration, becomes difficult or prohibitively costly; and
- Project would result in loss of riparian zone vegetation or other plant communities considered to be rare, unique, or sensitive by federal, state, or local agencies.

4.1.5.2 Impacts

Vegetation. The Broadwell Lake region is an undisturbed desert ecosystem of low productivity in all but the wettest rainfall years and during periods following late summer/early fall storms. Vegetation that would be affected by the Repository facilities and borrow sites consists of the most common desert types. The proposed project facilities and borrow areas would disturb a total of 977 acres of desert vegetation (316 acres at the Repository site, 71 acres for road improvement, 363 acres at the coarse borrow site, and 227 acres at the clay borrow site). Vegetation is almost non-existent at the dry lake where the Repository and clay borrow sites are located. No rare, threatened, or endangered plant species, as designated by the state or federal government, were found at the Broadwell Lake site, and no impacts are expected to occur. Crucifixion thorn (*Castela emoryi*) was identified by the California Native Plant Society (CNPS) as possibly occurring in the project vicinity. However, no plants were observed during the field surveys.

Little literature documentation exists for botanical resources of this area, and the 1989 and 1990 seasons were very poor for detection of most plants. Although the likelihood is that no rare, threatened, or endangered plants would be detected, an additional survey in a year of greater rainfall would provide a greater degree of confidence that no unusual species have been overlooked.

There is little vegetation at the Repository and the clay borrow sites. However, cottontop cactus (*Echinocactus polycephalus*) is commonly found at the coarse/aggregate borrow site. Although not an endangered species, loss of these plants is considered to be an adverse impact.

Wildlife. Sensitive animal species that have been reported from the area or were detected during the field surveys include desert tortoise, burrowing owl (*Athene cunicularia*), prairie falcon (*Falco mexicanus*), LeConte's thrasher (*Toxostoma lecontei*), desert kit fox (*Vulpes macrotis arsipus*), and bighorn sheep (*Ovis canadensis*) The Broadwell Basin is located within the distributional ranges of seven sensitive bat species. Likely impacts on these animal species are discussed below.

The desert tortoise is probably the most important sensitive species that has been reported from the Broadwell Basin area. Its sensitivity is enhanced by its recent August 1989 emergency listing as an endangered species. It was formally listed as a federally threatened species on April 2, 1990. The desert tortoise is also listed as a threatened species on the state level.

The proposed facility would be located in an area designated by the BLM as Category III habitat, with an estimated density of zero to 20 tortoises per square mile. LaBerteaux et al. (1990) found no evidence that desert tortoises currently occupy the project site, but ten inactive cover sites (i.e., burrows) and an old tortoise carcass were documented within the affected area. Four of these cover sites were later investigated with a fiber optics scope and no tortoise sign was observed, nor was tortoise sign other than the above burrows/carcass noted within the affected area. Tierra Madre

Consultants concluded in their biological assessment that this and other studies indicate the "probable presence of desert tortoise within the Broadwell Basin at very low densities" and that "aside from the dry lake playa, the entire Basin is ostensibly suitable desert tortoise habitat." Recent BLM wildlife surveys to the east, west, and south of the proposed project area have come to a similar conclusion, namely that tortoises occur at very low densities (zero to 10 tortoises per square mile) within the affected area and that suitable habitat for the species is separated by several unsuitable habitat zones such as dry lake playas. Suitable desert tortoise habitat within the immediate vicinity of the 977 acres proposed for development is currently estimated at 534 acres, as delineated below.

Facility Development	Suitable Habitat Acreage	Unsuitable Habitat Acreage
Entrance/treatment area	100	
Repository site		216
Crucero Road	64	
Coarse borrow site	363	
Clay borrow site		227
Road to coarse borrow site	7	
Total	534	443

Both direct and indirect impacts to desert tortoises are anticipated to occur as a result of the proposed action. Direct impacts, including potential vehicle-related tortoise injury and/or mortality due to increased levels of vehicles use and material transport in the affected area, construction-related tortoise injury and/or mortality (burrow collapse, entrapment, etc.), and a loss of 534 acres of tortoise habitat, are projected to occur as the project is currently proposed.

Indirect impacts, although less certain to occur, include possible disruption of tortoise dispersal corridors as well as potential enhancement of raven habitat through the provisioning of roosting sites and food sources. Any additional enhancement of raven habitat could indirectly affect desert tortoises by increasing the area's attractiveness to ravens, because ravens have been shown to be effective predators upon young tortoises.

These potential impacts could be considerably reduced with appropriate mitigation measures (Section 4.1.5.3). However, the proposed mitigations would not eliminate impacts to the desert tortoise resulting from the proposed action. Approximately 534 acres of suitable BLM Category III tortoise habitat would be lost to long-term conservation management for this species as a result of the proposed action. In order to offset this residual impact, the project proponent shall acquire sufficient offsite habitat lands to compensate for the unmitigated impacts of the project on the desert tortoise. The amount of offsite compensation is based on an evaluation of the proposed project's size, potential impacts, and tortoise resources as described in *Recommendations for the Management of the Desert Tortoise in the California Desert* (1988). The BLM compensation formula defined in that document yields a compensation ratio of 3:1 for the proposed action. Therefore, desert tortoise habitat acreage totaling 1,602 acres shall be purchased by the proponent and transferred to the BLM. All compensation lands shall be within BLM designated Category I tortoise habitat and shall be approved by the BLM prior to satisfaction of this requirement, Because all lands within BLM designated Category I habitat are not suitable tortoise habitat. This compensation requirement must be satisfied prior to, or within six months following, the initiation of construction activities.

Burrowing owls were not found within the entrance facilities area or on the coarse borrow site, and they would predictably not be found on the clay borrow site; all owl signs were found peripheral to these areas. Therefore, impacts would be limited to disruption of residents or nesters by ongoing activities. These impacts are not considered significant because operations would predictably force residents and nesters to move away from mining and other operational activities. There is a large amount of vacant habitat on adjacent areas within the basin that would not be directly affected by Repository operations. Burrowing owls would predictably continue using lands within the basin, but farther removed from ongoing operational activities.

Suitable nesting sites for prairie falcons are located in the nearby Cady Mountains, but no such sites occur on any of the facilities or borrow sites. Prairie falcons may hunt small birds and reptiles within the basin during the winter months, and as such, Repository operations may discourage them from extensively using areas adjacent to the various facilities. Even so, there is substantial open space surrounding the basin and the loss of some foraging habitat for the species is not considered a significant impact.

Suitable habitat for LeConte's thrasher exists throughout the project site, excluding the clay borrow site, and especially along the washes on the coarse borrow site and along those that cross Crucero Road to the south. One pair of thrashers was found in Argos Wash, which crosses Crucero Road to the south; another pair approximately one mile north of there in the northern portion of that wash; and a single bird on the coarse borrow site. Three apparent LeConte's thrasher nests were also found on the coarse borrow site.

Nesting and resident LeConte's thrashers are likely to be affected by the initial mining of the coarse borrow site. Ongoing mining activities are likely to discourage future nesting on this borrow site and may negatively affect nesting thrashers in the washes that cross Crucero Road to the south.

Impacts to kit foxes would necessarily involve the loss of habitat from the coarse borrow site and the entrance facilities site. Kit foxes may be killed along Crucero Road and various unimproved roads, but roadkills would likely be minimized because traffic would occur during the day and kit foxes are a predominantly nocturnal species.

Impacts to bighorn sheep are not likely to occur as a result of the proposed action. If bighorn sheep is reintroduced to the Bristol Mountains, it is possible that a bighorn travel corridor could become established between the Cady and Bristol mountains. Given the geographical location of these two mountains in relation to the dry lake playa, it is likely that such a corridor would occur north of the lake and away from the proposed facilities.

Some of the bat species may forage within the Broadwell Basin, but there are no suitable roosting or breeding sites within the basin. Therefore, potential impacts to these species are limited to disrupting foraging habitat. Given their mobility, it is likely that bats could find other areas if the project disrupts potential foraging habitat within Broadwell Basin. Therefore, impacts to bats are considered insignificant.

4.1.5.3 Mitigation Measures

B-1. The project proponent shall designate an individual as a contact representative who will have the authority to ensure compliance with protective stipulations for the desert tortoise and be responsible for coordination with the BLM, U.S. Fish and Wildlife Service (USFWS), and California Department of Fish and Game (CDFG). Such designated representative shall have the authority to halt activities that are in violation of BLM stipulations. Unless specifically authorized in the incidental take statement of the biological opinion, the designated representative is not authorized to handle desert tortoises.

B-2. Project personnel shall be briefed on the status of the desert tortoise and protection measures designed to reduce potential impacts to this species. Personnel shall be advised that handling, harming, or harassing tortoises without specific authorization is a violation of the federal Endangered Species Act. Personnel will also be advised of the potential penalties (up to $25,000 fine and six months in prison) for taking a listed species without a permit. Handouts containing this information will be provided.

B-3. Planned ancillary facilities, such as gates and chainlink fences, shall be modified to include tortoise-proof fencing along the lower 18 inches of fencing. This fencing shall extend 18 inches above and 12 inches below ground level. Additional tortoise-proof fencing shall be installed on both sides of the requested right-of-way roads.

B-4. The tortoise-proof fence shall be installed in a manner that will avoid tortoise injury or death and will avoid tortoise burrows (by routing the fence so that burrows are outside the work area) whenever possible.

B-5. A USFWS/CDFG approved biologist(s) experienced in identifying desert tortoise burrows/sign will be required on the site during fencing activities. This authorized biologist(s) shall designate work areas by some visible means, such as flagging, and will have the authority to halt project operations should any activity pose the potential for tortoise "take." Should the possibility of "take" arise, project operations will cease until the approved biologist(s) moves the tortoise out of harm's way.

B-6. A USFWS/CDFG approved biologist shall inspect the fence to ensure its integrity and oversee any necessary alterations prior to the onset of construction activities.

B-7. The proponent shall be responsible for maintaining the integrity of the fence for the life of the project.

B-8. Following tortoise-proof fencing, a USFWS/CDFG approved biologist shall survey the enclosed areas and hand-excavate all possible tortoise burrows. Any tortoises found shall be relocated outside the fenced enclosure, according to USFWS/CDFG specifications. Any tortoise excavated shall be placed outside the fenced area in an artificial burrow at least six feet in length and of the same diameter, depth, and orientation as the one in which it was found. Wood or plastic materials may be used to strengthen the tunnel and/or chamber of the burrow. Any tortoise found aboveground shall be placed outside the fenced area in the shade of a shrub, in the direction in which it was facing, in an adjacent undisturbed area where it will not be affected by construction activities. This survey shall be performed prior to construction activities.

B-9. Only persons authorized by the USFWS under the auspices of a Biological Opinion shall be permitted to handle any tortoises that may be found during the pre-construction and operational phases of this project. The project proponent shall supply the BLM, CDFG, and the USFWS with the name(s) and credentials of the biologist(s) at least 15 days prior to the onset of any construction activities for the review and approval of the agencies. All handling of tortoises shall be in accordance with protocol developed by the USFWS and the CDFG, including the use of disposable latex gloves. All materials that come into contact with tortoises shall be used only once and then properly discarded to minimize contact with the causative factor(s) for Upper Respiratory Disease Syndrome.

B-10. A litter control program shall be implemented during construction and operational phases of the proposed project, to reduce the area's attractiveness to ravens and other tortoise predators. All trash and food shall be promptly placed in covered receptacles and removed regularly.

B-11. No later than 90 days after the completion of construction, the designated biologist (or other appropriate individual) shall submit a post-construction biological report to the BLM, USFWS, and CDFG. This report shall document the effectiveness of the tortoise mitigation measures and the level of take associated with the project.

B-12. The USFWS is to be notified within three days of the finding of any threatened or endangered species found dead or injured as a result of this action. Notification must include the time, date, and location of the injured species or carcass, plus any other pertinent information. Dead animals may be marked in an appropriate manner and left on the site. Injured animals should be transported to a qualified veterinarian. Should any treated animals survive, the USFWS should be contacted regarding the final deposition of the animals.

B-13. The cottontop cactus is likely to be lost throughout the 363-acre borrow site northwest of the Repository site. The cacti shall be collected and transplanted to an adjacent habitat within the region.

B-14. Mining at the coarse borrow site shall not be initiated between late February and late May when LeConte's thrashers breed and raise their young. Initiating mining after late May will allow newly fledged thrashers to leave the site and, therefore, not be affected by mining activities.

B-15. A revegetation program shall be implemented on the coarse borrow site pursuant to an approved reclamation plan. The proposed revegetation program includes the use of test plots to determine the best methods to successfully accomplish revegetation. For a more detailed discussion of the revegetation program, see the reclamation plan attached as Appendix F.

4.1.5.4 Significant Unavoidable Adverse Impacts

Proposed mitigations would not eliminate impacts to the desert tortoise. The impacts would be unavoidable and offsite compensation would be required to meet BLM requirements.

4.1.6 Cultural and Paleontological Resources

4.1.6.1 Criteria for Significance of Impact Determination

Impacts to cultural resources were considered significant if they:

- Affect districts, sites, highways, structures, or objects listed in or eligible for listing in the National Register of Historic Places (NRHP), or may cause loss or destruction of significant scientific, cultural, or historical resources;
- Affect Native American sites important to their physical universe or belief system;
- Result in major reduction of access to traditional Native American use areas or sacred sites; and

- Result in loss of important paleontological specimens or fossiliferous sediments from construction activities or unauthorized collection.

4.1.6.2 Impacts

Prehistoric Resources. Thirteen fragments of jasper were identified and recovered during a survey of the proposed realignment of Crucero Road above the 100-year flood line. Of these, eight were prehistoric artifacts (cores and/or flakes), four were identified as shatter, and one was a miscellaneous fragment of possible cultural origin. The artifacts appear to have been redeposited at their current locations as a result of sheet wash from higher locations to the southwest and reflect little or no site integrity. The realignment of the road, therefore, should have no impact on significant prehistoric cultural resources. No prehistoric sites were recorded on the surface in other proposed project areas. However, there is a potential for buried sites along the Pleistocene lakeshore. It is most likely that such buried sites would be considered NRHP eligible because of their potential to yield data relevant to a variety of research issues on early human occupations and paleoenvironmental conditions. If buried sites are encountered, there would be a significant adverse effect on prehistoric sites, unless the effect is mitigated.

Historic Resources. Two NRHP eligible historic sites would be affected by the proposed action. The World War II training camp (CA-SBR-6302-H) would be adversely affected by improvements to Crucero Road. Of concern are the probable secondary impacts associated with improved access to the site. With a paved road running through the middle of the site, the camp remains would be much more susceptible to damage from unauthorized artifact collection and vehicle traffic.

The other NRHP eligible site in the vicinity, the Tonopah and Tidewater Railroad (CA-SBR-2340-H), would be affected by the excavation of the clay borrow area. Although the incorporation of a buffer zone in the borrow area design will prevent direct physical impacts to the railroad site, the borrow pit would constitute a visual intrusion on the historic setting of the site. Eventual erosion of the east wall of the clay borrow area could indirectly threaten the railroad berm through slumping and undercutting in the buffer zone. The visual intrusion and secondary erosional damage would both be adverse effects. However, the impacts would not be significant because they would only involve a short segment of the 30-mile long site.

The remnant of a military rock alignment would be disturbed as a result of the Crucero Road realignment above the 100-year flood line. Because the majority of the feature has been destroyed by erosion, all structural integrity is lost. Therefore, the impact would not be significant.

Native American Resources. No sensitive Native American sites have so far been identified in the proposed project area. Impacts are, therefore, not expected to be significant.

Paleontological Resources. Of the 11 fossil finds identified on the west side of Broadwell Lake, seven occurred within proposed project impact areas. Although all the fossils were collected during field survey, the potential for additional buried fossils occurs in the vicinity of the surface finds. Therefore, significant impacts to paleontological resources could occur as a result of the project.

4.1.6.3 Mitigation Measures

C-1. Because there is a possibility that buried prehistoric sites may be encountered along the Pleistocene lakeshore, all excavation of fanglomerates shall be monitored by a qualified archaeologist. Resources discovered during construction shall be evaluated by the BLM in consultation with the California State Historic Preservation Officer (SHPO) and appropriate Native American groups prior to further ground-disturbing activities. If subsurface cultural resources are discovered during construction, the archaeological monitor shall have the authority to halt work in the area of the discovery to permit evaluation of the resources. The project proponent shall notify the BLM, and the BLM archaeologist shall consult with the SHPO, and make recommendations within 72 hours. If a buried site is determined to be NRHP eligible then a mitigation plan (i.e., data recovery and excavation) shall be prepared, approved, and implemented prior to any additional construction activities. Where the BLM fails to provide direction within 72 hours, the project proponent may resume operations, while attempting to limit damage to the discovered resource to the extent possible.

C-2. Secondary impacts to the Tonopah and Tidewater Railroad berm shall be minimized by the use of physical and/or mechanical erosion control measures as appropriate on the east side of the clay borrow area in accordance with the approved reclamation plan.

C-3. The site of the military camp shall be fenced to minimize the potential damage resulting from increased access.

C-4. Adverse impacts to sensitive Native American resources, if any are identified, shall be mitigated in consultation with Chemehuevi and Mojave tribal representatives.

C-5. Areas to be disturbed by the project shall be monitored during construction by a qualified paleontologist. The paleontological monitor will have the authority to halt construction in the area of paleontological finds. The BLM will be notified upon identification of paleontological resources. The resources will be evaluated by the BLM, in consultation with the monitor, prior to further ground disturbance. If the resources are determined to be significant, they will be excavated by a qualified paleontologist prior to any additional construction activities.

4.1.6.4 Significant Unavoidable Adverse Impacts

Direct impacts to cultural resources within the project area are unavoidable. However, the mitigation measures would allow compliance with federal regulations for the preservation of cultural resources and would reduce the impacts to a non-significant level.

4.1.7 Air Quality

4.1.7.1 Criteria for Significance of Impact Determination

Air quality impacts were considered significant if:

- The project results in any increase in emissions of a pollutant and/or its precursors in an area that has been classified as nonattainment for that pollutant;
- The emissions from the project (direct and indirect sources) cause a sufficient increase in the ambient concentration of a pollutant to result in predicted violations of the federal or state ambient air quality standard and/or of a Prevention of Significant Deterioration increment in an area that is classified as attainment for that pollutant;
- The project results in the emission of toxic or hazardous air pollutants; and
- The project is not consistent with the requirements of any of the following documents:

  - Local air quality management plan;
  - Rules and regulations of local air quality district; and
  - State Implementation Plan (SIP).

4.1.7.2 Impacts

The proposed action would generate pollution emissions from a number of activities. These activities would occur both off the site, such as the highway trucks used to haul the waste, and on the site, including all operations at the Broadwell Basin site. Pollutants would be emitted from stationary sources, such as evaporative emissions from the Repository, and mobile sources, such as the heavy duty equipment used to cap the waste. Project sources can be grouped into three emission types: motor vehicles, fugitive dust sources, and fugitive vapor sources. Motor vehicles include highway haul trucks and off-highway equipment. Fugitive dust sources include short-term construction activities, Repository road use, waste covering, borrow site activity, and wind erosion. Fugitive vapor sources include the disposal cell, the organic treatment facilities, and the onsite fuel storage tanks.

Motor vehicles would generate exhaust emissions and, in the case of onsite vehicles, fugitive dust from unpaved roads and cover material handling. Processing of cover material would produce particulate emissions as aggregate excavated from the borrow area is transported to the Repository. After the waste is deposited into the storage cell, organics in the waste would evaporate until the cell is capped with the final cover material.

Construction Emissions. Temporary emissions would be produced during the construction of project facilities. The main construction projects would be the improvements to the facility access road between Ludlow and the Repository, the construction of the Repository modules, the construction of the onsite administration buildings, stabilization and treatment facilities, and construction of the road located on the protective berm surrounding the storage cell and the onsite facility for testing of the waste. Fugitive emissions from the construction of the Broadwell Basin project would result from: (1) dust entrained during excavation at the coarse and clay borrow area; (2) dust entrained during travel on unpaved haul roads; (3) dust entrained during clay and coarse loading and unloading operations; (4) dust entrained during coarse and clay spreading and grading; (5) dust entrained from crushing, screening, and transferring material at the screening plant located at the coarse and clay borrow areas; and (6) wind erosion of areas excavated at the coarse and clay borrow areas. Heavy equipment exhaust emissions would result from: (1) exhaust from the heavy construction equipment used for excavation and construction; (2) exhaust from the water trucks used to control construction dust emissions; and (3) exhaust from the diesel generator located at the temporary aggregate screening plant. Estimates of pollutant emissions resulting from construction activities are presented in Table 4.1.7-1.

Because the sources of construction emissions would be mobile equipment dispersed over a large area, the ambient concentrations resulting from these emissions would be relatively low and would not significantly contribute to violations of the ambient standards. Also, these emissions would cease when the construction of the facilities is completed. Therefore, the temporary short-term air quality impacts would not be classified as significant.

Offsite Operations Emissions. A summary of the rate of pollutant emissions (nitrogen oxide [NO_x], carbon monoxide [CO], particulate matter greater than 10 microns in diameter [PM_{10}], volatile organic compounds [VOC], and sulfur dioxide [SO_2]) from the total project is presented in Table 4.1.7-2. The

Table 4.1.7-1

Construction Emissions
(lb/day)

	NO_X	CO	PM_{10}	VOC	SO_2
Construction Equipment (Exhaust)	662.34	282.83	42.78	43.60	20.53
Fugitive Dust	0.00	0.00	434.86	0.00	0.00
Total	662.34	282.83	477.64	43.60	20.53

Table 4.1.7-2

Total Emissions From Proposed Action
Broadwell Basin Residuals Repository
San Bernardino County, California
(Tons/Year)

Activity	NO_x	CO	PM_{10}	VOC	SO_2
Offsite Source - South Coast Air Basin:					
On-Highway Trucks (Exhaust)	70	33	10	11	2
On-Highway Trucks (Dust)	0	0	0	0	0
Subtotal	70	33	10	11	2
Offsite Sources - South Central Coast Air Basin:					
On-Highway Trucks (Exhaust)	1	1	0	0	0
On-Highway Trucks (Dust)	0	0	0	0	0
Subtotal	1	1	0	0	0
Offsite Sources - San Diego Air Basin:					
On-Highway Trucks (Exhaust)	6	3	1	1	0
On-Highway Trucks (Dust)	0	0	0	0	0
Subtotal	6	3	1	1	0
Offsite Sources - Southeast Desert Air Basin:					
On-Highway Trucks (Exhaust)	168	79	24	26	6
On-Highway Trucks (Dust)	0	0	1	0	0
Subtotal	168	79	25	26	6
Subtotal, Offsite	245	116	37	38	8
Onsite Sources - Southeast Desert Air Basin:					
Vehicle Exhaust	41	15	4	4	3
Fugitive Dust	0	0	80	0	0
Repository Cell Emissions	0	0	0	18	0
Onsite Fuel Storage	0	0	0	0	0
Emergency Generator	2	0	0	0	0
Subtotal, Onsite	43	15	84	22	4
PROJECT TOTAL	287	131	121	61	12

offsite emissions are the result of transporting the waste, by heavy duty diesel trucks, from the area of origin to the Broadwell Lake facility. Truck transportation would produce exhaust emissions from the diesel engines and fugitive particulate emissions from highway dust entrainment. The emission rates shown in the table are based on emission factors obtained from the California Air Resources Board (CARB) transportation models, EMFAC7D/BURDEN7B, for the 1995 calendar year. The SO_2 emissions factor assumed 0.05 percent sulfur fuel. Most of the offsite emissions would occur in the Southeast Desert Air Basin (SEDAB) and the South Coast Air Basin (SCAB). About 65 percent of the total emissions would occur in the SEDAB while about 30 percent would occur in the SCAB.

Onsite Mobile Emission. Onsite mobile emissions would consist of pollutants emitted from waste trucks traveling from Ludlow to the Repository and from the following construction equipment:

- 1 Bulldozer (track)
- 3 Front end loaders (wheel)
- 1 Scraper
- 1 Compactor (wheel)
- 1 Fuel Truck

Non-mobile equipment that would periodically produce exhaust emissions includes a 250-kilowatt emergency generator which would be located on the site for potential power outages. Emissions from the above equipment are shown in Table 4.1.7-2. The pollutants with the highest emission rates are NO_x and CO, with rates of 287 and 131 tons per year, respectively.

Evaporative Emissions. Some of the organic material contained in the waste would evaporate after placement in the disposal cell. The Environmental Protection Agency's (EPA's) Hazardous Waste Treatment, Storage and Disposal Facilities Air Emission Model (Chem Dar 7) was used to estimate the evaporative emissions from the cell. Two modes of the EPA model were used to calculate emissions. The open landfill mode was used to calculate evaporative emissions from the top layer of waste in the disposal cell which would have direct contact with ambient air. The closed landfill mode was used to calculate evaporative emissions from all layers covered with aggregate material or hardened layers of waste. According to the engineering firm responsible for the design of the facility (EMCON Associates), the following organic contents would represent a likely maximum level of organics in waste streams at the Repository:

(1) Benzene -250 milligram (mg)/kilogram (kg) of waste;
(2) Toluene -1,000 mg/kg of waste;
(3) Xylene -2,000 mg/kg of waste; and
(4) Ethylbenzene -250 mg/kg of waste.

These concentrations were derived from contaminated soil removed from remediation jobs on leaking underground storage tanks (e.g., gas tanks at service stations), where the soil was subsequently sent to a Class I facility for treatment and/or disposal. The levels were determined to be typical of the chemical analyses of the numerous soil samples collected on each of dozens of such remediation jobs.

This waste stream generally represents the highest expected incidence of volatile organic contaminants in waste. Also, these high numbers are additionally conservative because of state and federal Land Disposal Restrictions which require that waste be treated down to protective levels prior to placement in a Repository or landfill.

The above organic contents were used to estimate the evaporative emissions from the disposal cell. The average daily evaporative emissions from the cell are summarized in Table 4.1.7-3. In addition to evaporative emissions from the disposal cell, some organic emissions would occur from gasoline and diesel storage tanks aboveground on the site. Organic emissions would occur during the monthly filling of the tanks, from tank breathing losses caused by ambient temperature changes, and during the fueling of mobile equipment (Table 4.1.7-3).

The potential pollutants that would be emitted from the disposal cell are all air toxics. Benzene, whose emission rate is estimated at about 24 pounds per day, has the highest toxicity classification of the four organic compounds emitted from the cell. Benzene is classified as a potential human carcinogen.

Fugitive Dust. Almost all project activities that involve the use of mobile equipment would generate fugitive dust. The movement of waste trucks over the gravel access road and the transport of aggregate over the unpaved road from the borrow area to the disposal cell would cause fugitive dust emissions. The aggregate material would be batch unloaded at the Repository cell and a front-end

Table 4.1.7-3

Average Daily Organic Evaporative Emissions From Broadwell Basin Residuals Repository

Source	Pollutant	Emission Rate (lb/day)
Disposal Cell	Benzene	24.3
	Ethyl Benzene	5.1
	Toluene	35.7
	Xylene	31.8
Gasoline Storage Tank	Hydrocarbons	0.32
Diesel Fuel Storage Tank	Hydrocarbons	0.01

loader would spread and compact the material over the waste. The scraper unloading and the cover spreading process would also cause fugitive dust emissions at the disposal cell. The front-end loader would also spread and compact the alluvium or clay cover material. The combination of high moisture content and the addition of a stabilization agent would result in negligible fugitive dust emissions during the inorganic waste interim cover spreading process.

The inorganics stabilization and organics treatment facilities would be completely indoor facilities containing various treatment units which would mix the waste with a stabilization or treatment solution containing water and assorted reagents. The combination of high moisture content (resulting from the addition of water) and the addition of the assorted reagents would result in negligible fugitive dust emissions when the waste would be initially batch unloaded at the facility, transported to the various treatment units for treatment, or batch unloaded from the various treatment units to the adjacent curing/staging ponds after treatment.

Wind erosion would also cause fugitive dust emissions from the area disturbed during the excavation of cover material at the aggregate borrow area. The remaining exposed area of the facility would have negligible wind erosion because of watering or use of chemical dust suppressant on all unpaved road surfaces, the use of soil cement on the sides of the disposal berms, and the moisture content of the waste. As shown in Table 4.1.7-2, the PM_{10} fugitive dust emissions from the project would be about 663 pounds per day.

Ambient Concentrations. Air quality modeling was used to estimate the ambient concentrations resulting from the pollutant emissions described in the previous paragraphs. The EPA Industrial Source Complex and the California Department of Transportation (Caltrans) CALINE 4 models were used to model the emissions. A screening analysis was performed that used wind speed and atmosphere stability combinations specified by the EPA to determine the highest ambient pollutant concentrations. Wind speeds were varied across the spectrum found in this region and wind directions were varied around the compass. This type of screening analysis generally results in overestimates of concentrations, and thus, provides an estimate of worst-case conditions. Table 4.1.7-4 presents the results of the air quality modeling analysis. Predicted maximum total ambient concentrations (project plus background) for CO, NO_2, and SO_2 are below the National and State Ambient Air Quality Standards. However, PM_{10} concentrations are above the national and state standards.

Impact Summary. The air quality impacts resulting from the construction and operation of the proposed Broadwell facility would be significant. The project area has been classified by the state as nonattainment for PM_{10} and ozone. The air quality analysis indicates that maximum PM_{10} concentrations, resulting from project emissions, would cause violations of both state and national PM_{10} standards. Although the increase in pollutant emissions caused by the proposed project operations would be relatively small when compared with the total pollutant burden in the SEDAB, the increase, without compensating offsets, would impede progress in achieving a reduction in district-wide emissions. The California Clean Air Act of 1988 requires a reduction of five percent

Table 4.1.7-4

Maximum Impact of Proposed Broadwell Project on Ambient Air Quality
(without mitigation)
(all concentrations in micrograms per cubic meter)

Pollutant/ Averaging Time	California Standards	National Standards	Maximum Offsite Concentration	Maximum[1] Background (1984-88)	Maximum Cumulative Impact	Maximum Impact at Class I Area	Allowable Class I Area Increment
CO							
1-hour	23,000	40,000	22.7	6,640	6,662.7	----	----
8-hour[2]	10,000	10,000	15.9	4,419	4,434.9	----	----
NO_2							
1-hour	470	---	52.5	167.0	219.5	----	----
Annual	---	100	5.3	25.6	30.9	0.06	2.5
SO_2							
1-hour	655	---	5.5	289.0	294.5	----	----
3-hour[2]	---	1,300	5.0	199.0	204.0	0.06	25
24-hour[2]	131	365	2.2	38.6	40.8	0.02	5
Annual	---	80	0.6	2.8	3.4	0.006	2
PM_{10}							
24-hour[2]	50	150	65.8	92.2	158.0	0.27	10.0
Annual[2]	30	50	16.4	26.7	43.1	0.09	5.0

Note:
[1] From monitoring site located at the Cool Water Project site, 5 miles east of Daggett
[2] For project impacts
3-hour = 0.9 x 1 hour
8-hour = 0.7 x 1 hour
24-hour = 0.4 x 1 hour
annual = 0.1 x 1 hour

or more per year for each nonattainment pollutant or its precursors. Likewise, the offsite mobile emissions in the SCAB would add to the existing pollutant burdens in that basin.

In addition, some of the organic compounds that would be emitted from the Repository are classified as air toxics. Benzene, in particular, has been designated by state and federal agencies as a potential human carcinogen. Other air toxics that could be emitted from the site (toluene, xylene, and ethyl benzene), although less toxic than benzene, could also pose a health hazard to workers and residents in the area. Toxicity issues are discussed in the public health risk section.

4.1.7.3 Mitigation Measures

The following mitigation measures shall be utilized to minimize pollutant emissions from the construction and operation of the Broadwell Basin Residuals Repository:

A-1. Comply with CARB and local Air Pollution Control District standards, rules, and regulations, including Best Available Control Technology (BACT) related to emissions from heavy-duty diesel trucks and construction equipment.

A-2. Institute a regular preventative maintenance program for operating equipment to prevent emission increases due to mechanical problems.

A-3. Consider use of low-emitting diesel engines or low NO_x engines which meet highway standards for use in mining/construction vehicles.

A-4. Consider transporting waste to the Repository from the treatment facility by conveyor run by electricity.

A-5. Control fugitive organic evaporative emissions from the Repository surface through the application of temporary or stabilized foams, soil, or other types of approved cover material (frequency of cover to be determined by applicable regulations).

A-6. Control fugitive dust emissions from road surface through the application of water or chemical dust suppressants or by paving.

A-7. Control fugitive dust emissions in the borrow areas by pre-watering the area prior to excavation of the cover material, covering the borrow area stockpiles, and/or enclosing the borrow areas with a screen.

A-8. Establish an air toxics/meteorological monitoring program to gather data that would be used to perform a risk assessment for the area and to ensure the protection of the health and safety of both onsite personnel and the offsite general public.

A-9. Control fugitive dust emissions by revegetating the coarse borrow area upon completion of mining, as discussed in more detail in the reclamation plan (Appendix F).

4.1.7.4 Significant Unavoidable Adverse Impacts

Application of the mitigation measures would provide significant reductions in the emissions of particulates, NO_x, and SO_2. It is estimated that NO_x emissions would be reduced by about 19 percent while PM_{10} and SO_2 emissions would be reduced by about 70 percent. However, the emission rates from the project would still be significant and unavoidable. The estimated emission rates with mitigations are as follows:

NO_x	35 tons/year
CO	15 tons/year
PM_{10}	24 tons/year
SO_2	1 ton/year

Air quality modeling indicates that the state standards for PM_{10} only would still be exceeded after mitigation. Therefore, without compensating offsets (current San Bernardino County Air Pollution Control District New Source Review 1303 would not require offsets for the project), the emissions from the proposed project would impede the progress in achieving attainment for ozone and PM_{10} in the SEDAB and would result in unavoidable significant impacts on air quality.

4.1.8 Water Supply

4.1.8.1 Criteria for Significance of Impact Determination

An impact was considered significant if one or both of the following conditions would occur:

- Substantial reduction in the amount of water otherwise available and needed for public water supplies; and

- Groundwater pumping from the alluvium results in land subsidence.

4.1.8.2 Impacts

The Broadwell Basin, as a hydrologic unit, is relatively unknown. Historically, no wells had been drilled or pumped within the central portion of the basin until the recent well production and drawdown tests performed by the Broadwell Corporation. Without historic pumping data throughout the basin and without a long-term climatic record, it was not possible to make a forecast of annual recharge and long-term safe yield within the basin.

Therefore, a different approach was taken to evaluate the effects of providing the long-term water supply for the proposed project. Based on a carefully monitored pump test at the existing water production well within Broadwell Basin, the drawdown effects on the groundwater table of short- and long-term water consumption by the proposed project were modeled. These data can be compared to the criteria cited above and a determination of significance from producing and consuming local groundwater resources can be made.

The water demand for the proposed project is estimated to be an average of 275 gpm for the first year of construction and then an average of 50 gpm over the remaining period of operation. Based on an average of demand 275 gpm during the first year, the project would pump and consume an estimated 443 acre-feet per year (396,000 gallons or 1.21 acre-feet per day). This assumes no return to the groundwater table, which is the most conservative assumption. At an average demand of 50 gpm in the following year, the project would pump and consume an estimated 80 acre-feet per year (72,000 gallons or 0.2 acre-feet per day).

As described in Section 4.1.1.2, the maximum annual and average long-term water extraction was modeled to determine the amount of drawdown beneath the playa. The modeled results indicate a short-term drawdown of 0.10 feet at about 3,800 feet from the well and about 0.20 feet at 2,900 feet from the well. Based on these data, the potential for subsidence beneath the playa was concluded to be nonsignificant (see Brown and Caldwell hydrogeology study available as a Technical Appendix for more detail on the forecast and modeling methodology).

However, these data also indicate that, over the long-term, this project's water consumption would not cause a significant drawdown of groundwater at the proposed rates of extraction. The radius of zero drawdown identified by the model is approximately 4,000 feet from the well. This fact, combined with the fact that the groundwater in the basin is not suitable for domestic water supply and that it has not been used nor is proposed to be used, indicates that the impact of supplying water to the project over its projected life is nonsignificant. The project would not cause a substantial reduction in water resources available or needed for public water supply. Therefore, no significant impact to water resources would be caused by developing the proposed project, even if the project contributes to an overdraft of the basin over its life.

4.1.8.3 Mitigation Measures

No mitigation is required to reduce the adverse impacts identified for water supply. However, the groundwater data available from long-term pumping are a valuable piece of information in the regional picture. Therefore, the proponent shall provide the following data to the County:

W-1. The facility owner shall annually report the volume of water consumed, the groundwater table level at the production well and monitoring wells, and the amount of annual precipitation based on the water year, July 1-June 30 of the following year.

4.1.8.4 Significant Unavoidable Adverse Impacts

There are no significant unavoidable adverse impacts associated with water supply.

4.1.9 Scenic/Visual Resources

4.1.9.1 Criteria for Significance of Impact Determination

Impacts to scenic/visual resources were considered significant if:

- Project activities are in conflict with the Visual Resources Management (VRM) classes established by the BLM for the affected area;
- Degradation of visual and scenic quality of the area from the project is of a magnitude that it causes a permanent irritation to viewers of the affected landscape and rehabilitation is not possible; and
- Project activities include use of high intensity lights that would shine directly into nearby residences on a regular basis.

4.1.9.2 Impacts

Methodology. A two-part methodology has been used in analyzing the impacts of the proposed landscape additions at Broadwell Lake. First, the visual impacts associated with the proposed project have been analyzed using the VRM methodology developed by the BLM (U.S. Department of the Interior, Bureau of Land Management 1976, 1980). Second, five photographic visual simulations have been produced showing the proposed development. Visual simulation viewpoints have been chosen on the basis of their degree of exposure to the site and because they are generally representative of points of interest for the travelers along Interstate 40 and visitors to the Broadwell Basin. These are shown on Figure 4.1.9-1. Visual impacts have been determined for each viewpoint using the Visual Contrast Rating System, a key element of the VRM methodology.

Visual Resource Management Methodology and Visual Contrast Rating System. The methodology is based on research that has produced a method of assessing the aesthetic qualities of landscape change in objective terms. Aesthetic judgments concerning landscapes have previously been considered quite subjective, but can now be determined to have identifiable, consistent qualities that can be described and measured (Laurie 1975; Litton 1972). Whatever the terrain and whoever the observer, the perception of visual quality in a landscape can be based on these principles:

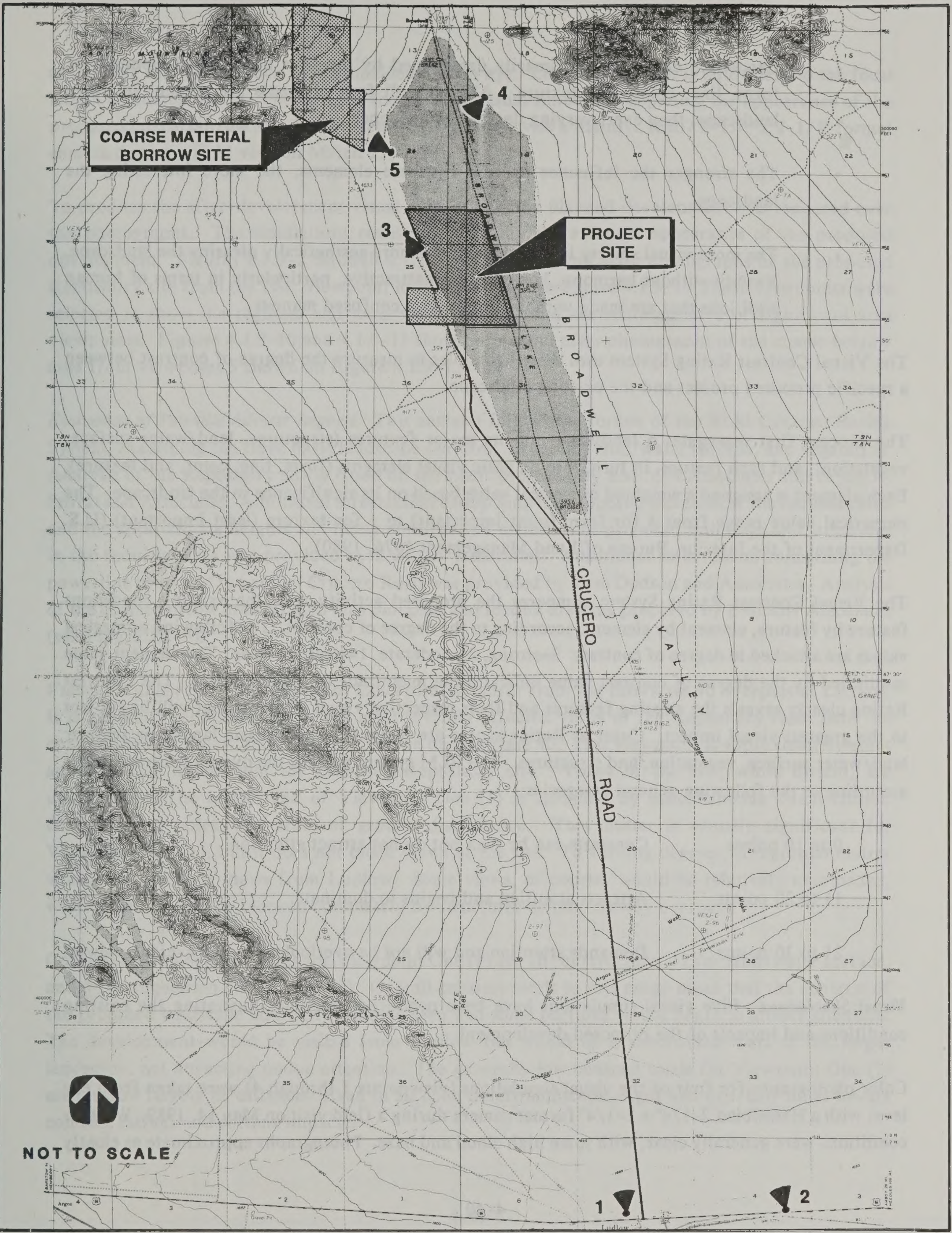


Figure 4.1.9-1 Viewpoint Locations for Visual Resource Analysis, Broadwell Basin Residuals Repository

- Landscape character is primarily determined by the four basic visual elements of form, line, color, and texture. Although all four elements are present in every landscape, they exert varying degrees of influence.

- The stronger the influence exerted by these elements, the more interesting the landscape.

- The more visual variety in a landscape, the more aesthetically pleasing the landscape. Variety without harmony, however, is unattractive, particularly in terms of human additions that are made without care or in a confused manner.

The Visual Contrast Rating System uses these principles to measure the degree of contrast between a specific proposed project and the existing landscape.

The process first segregates a landscape into its major features (structures, land/water surface, vegetation), and each feature, in turn, into its basic visual elements (form, line, color, and texture). Each element is assigned a weighted numerical value based on its significance in the landscape. The numerical value range from 4 for form (most important) to 1 for texture (least important) (U.S. Department of the Interior, Bureau of Land Management 1976, 1980).

The Visual Contrast Rating System compares the proposed activity with the existing conditions feature by feature, element by element, according to the degree of contrast. The following numerical values are attached to degree of contrast: 3=strong, 2=moderate, 1=weak, 0=none. The element value multiplied by the degree of contrast value indicates the magnitude of visual impact. The Contrast Rating clearly reveals the existing features and their respective visual elements that will be subject to the greatest visual impact. Contrast Rating scores are totaled for each basic landscape feature: land/water surface, vegetation, and structures. The BLM system defines the overall contrasts totals according to the following general categories:

0 to 10 points	Contrasts can be seen but do not attract attention.
11 to 20 points	Attracts attention and begins to dominate.
21 to 30 points	Demands attention and will not be overlooked by the average viewer.

Visual Simulations. Five visual simulations have been produced precisely illustrating the existing conditions and impacts of the proposed development.

Color photographs for four of the visual simulations (viewpoints 1 through 4) were taken from eye level with a Hasselblad 2-1/4" x 2-1/4" format camera during a field visit on May 14, 1989. Weather conditions were generally clear, with some high cloud and haze. Photographs approximate as closely as possible the view as seen by the unaided human eye. Lens focal length is equivalent to the focal length of human vision. Photographs for the fifth visual simulation depicting the appearance of the proposed coarse borrow area were taken from eye level with a Mamiya RB67 2-1/4" x 2-1/4" format camera during a field visit on March 21, 1991.

To produce the after-development visual simulations, the planned development was rendered over the photographs. The simulations realistically portray the eventual appearance of the proposed development. Figures 4.1.9-2 through 4.1.9-9 show before and after photographs of the proposed Repository site from the four viewpoint locations shown on Figure 4.1.9-1. These viewpoints were selected to show the regional and local visual impacts and are representative of significant area viewpoints. Figures 4.1.9-10 and 4.1.9-11 show before and after photographs of the coarse borrow area from viewpoint 5 shown on Figure 4.1.9-1.

Evaluation of Potential Adverse Impacts. This analysis follows the format of the BLM Contrast Rating System, examining the three basic landscape features: structure, land/water surface, and vegetation. Analysis of the Repository site is based on site plans prepared by EMCON Associates and Bryan A. Stirrat and Associates. Additional information concerning the proposed elevation of the facilities area and the approximate heights and likely construction materials of proposed buildings and structures in the facilities area was provided by EMCON Associates. Additional information concerning the powerline proposed to parallel Crucero Road was provided by Tom Dodson and Associates. Analysis of the coarse borrow area is based on a plot plan and section drawing prepared by EMCON Associates (see Figure 2.2-6).

Viewpoint One (1). This viewpoint looks directly north from the Interstate 40 overpass at Ludlow. It is generally representative of the most severely affected views of the Repository from both the community of Ludlow and from this portion of Interstate 40. This viewpoint is approximately eight and one-half miles from the proposed Repository site. Views of the site, while distant, are unimpeded. The foreground of Viewpoint One (1) is occupied by miscellaneous visual clutter: fences, signs, poles, and areas of ground disturbance. This clutter is visually significant for Viewpoint One (1), but it does not block views of the site. To varying degrees, foreground clutter would be typical of views from Ludlow. Some views, of course, would be relatively unimpeded, while others would be blocked completely by structures or the freeway overpass.

Contrast Rating System scores for Viewpoint One (1) are 16 for structure, 12 for land/water surface, and 8 for vegetation (Table 4.1.9-1). Overall contrast totals in this range mean that the contrast of the proposed landscape addition would be seen and some portions would begin to attract attention. The development would be visible from Ludlow but would be a subordinate part of the larger landscape, not attracting undue attention. The generally low contrast totals for Viewpoint One (1) are a result largely of distance. Even in an open desert landscape, eight and one-half miles lowers contrast ratings and softens impacts.

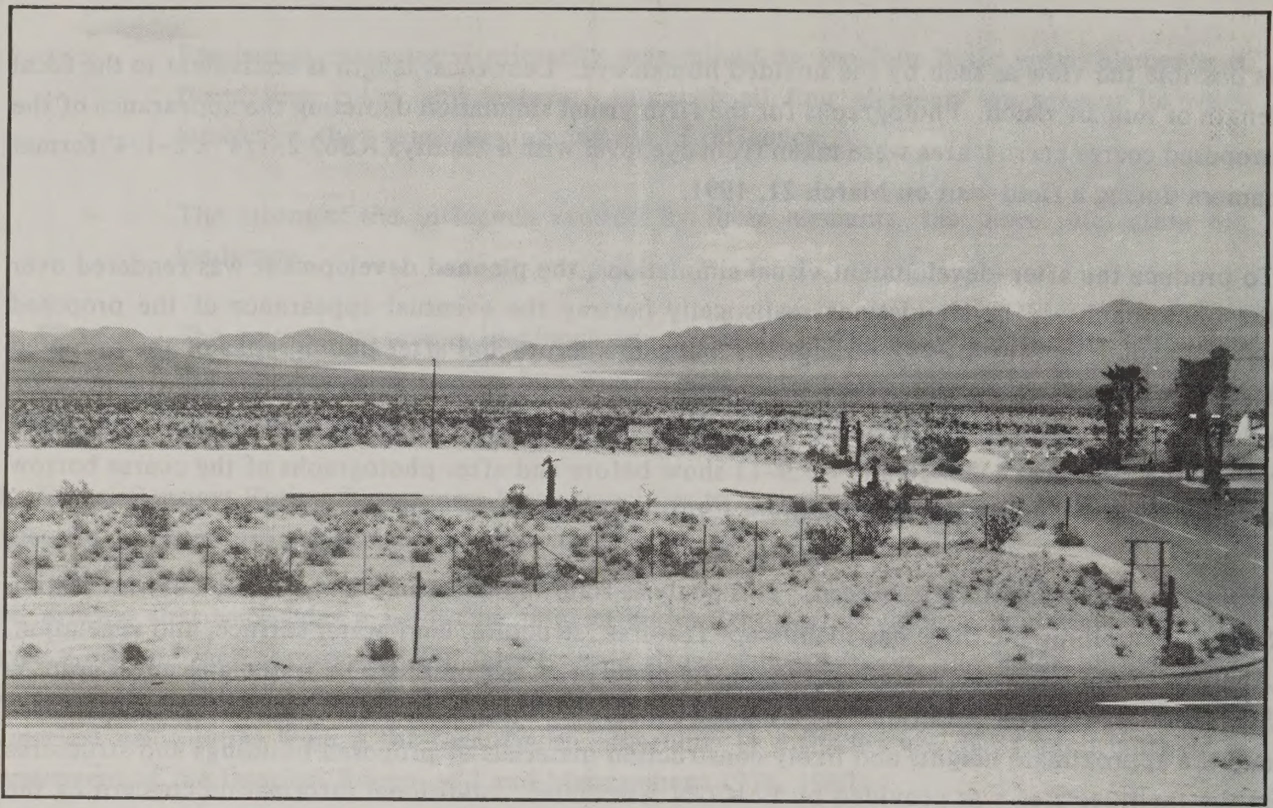


Figure 4.1.9-2 Viewpoint 1: Before Project - Looking North From I-40 Overpass at Ludlow

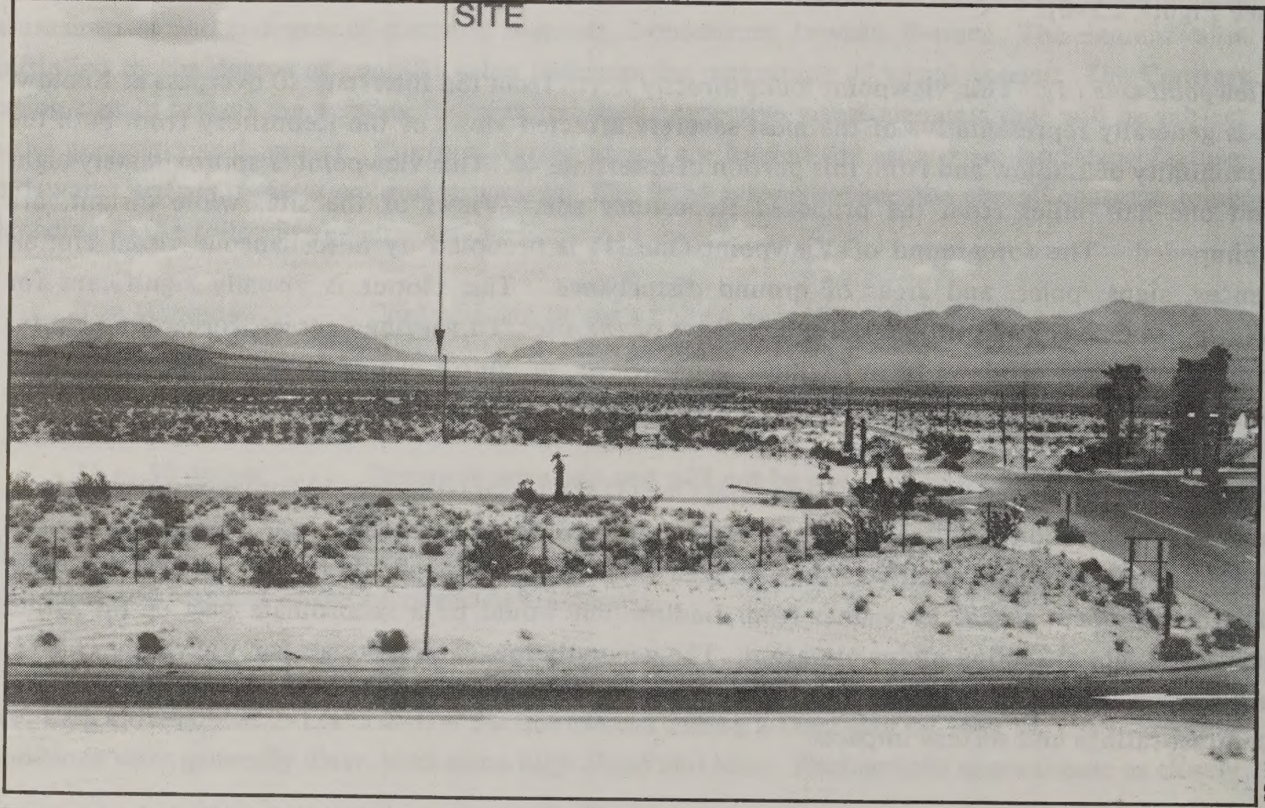


Figure 4.1.9-3 Viewpoint 1: After Project - Looking North at Site From I-40 Overpass at Ludlow

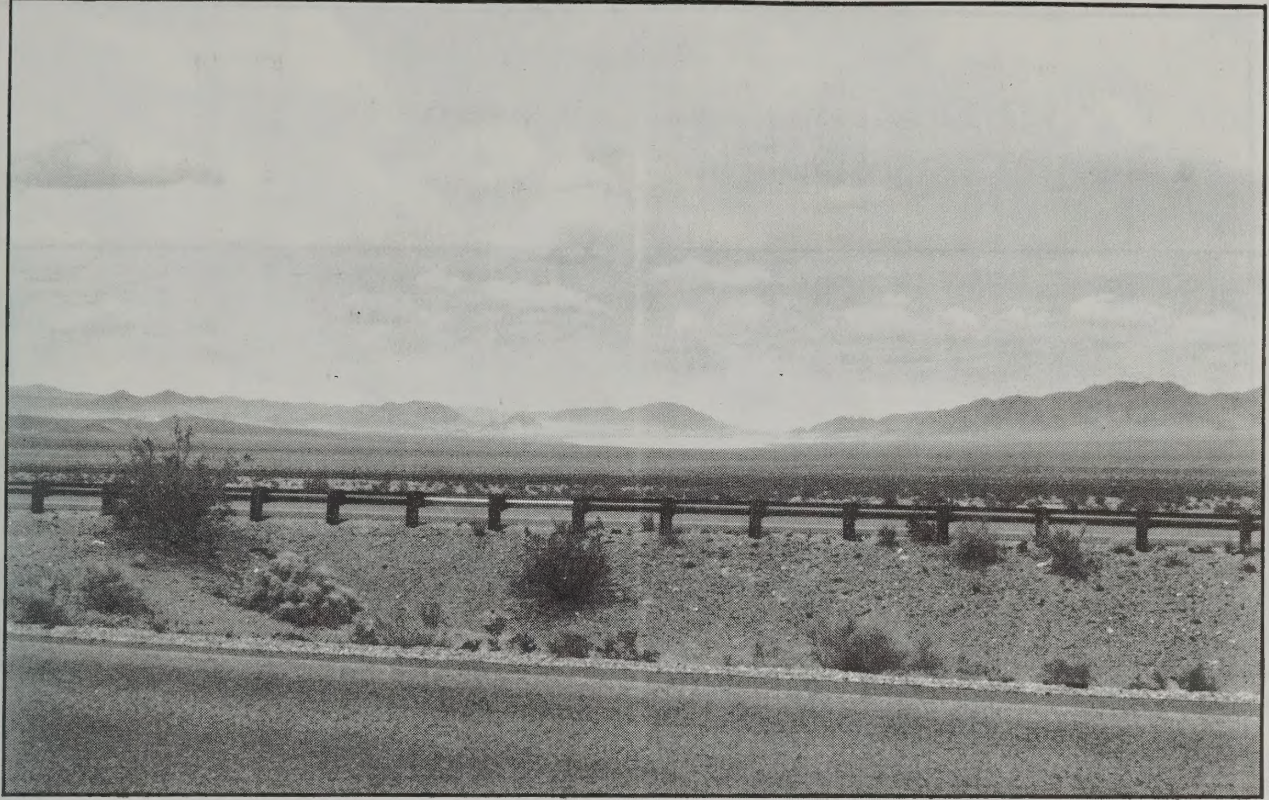


Figure 4.1.9-4 Viewpoint 2: Before Project - Looking North From I-40 East of Ludlow

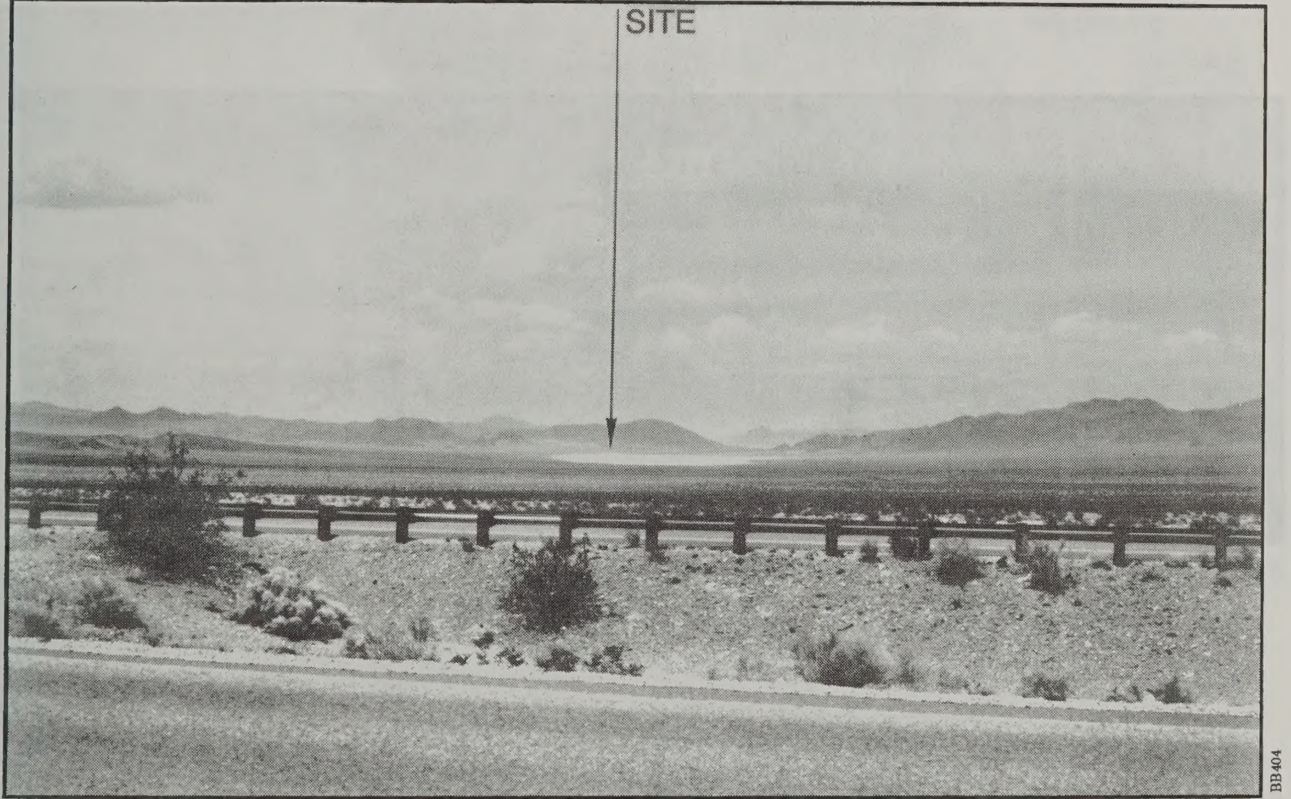


Figure 4.1.9-5 Viewpoint 2: After Project - Looking North From I-40 East of Ludlow

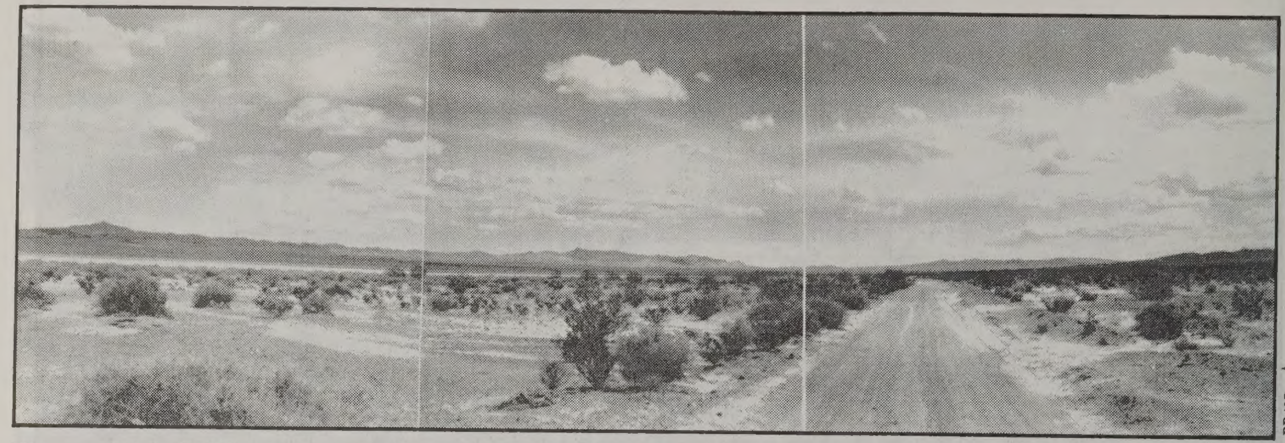


Figure 4.1.9-6 Viewpoint 3: Before Project - Looking South From Crucero Road 200 Feet North of Proposed Project Site

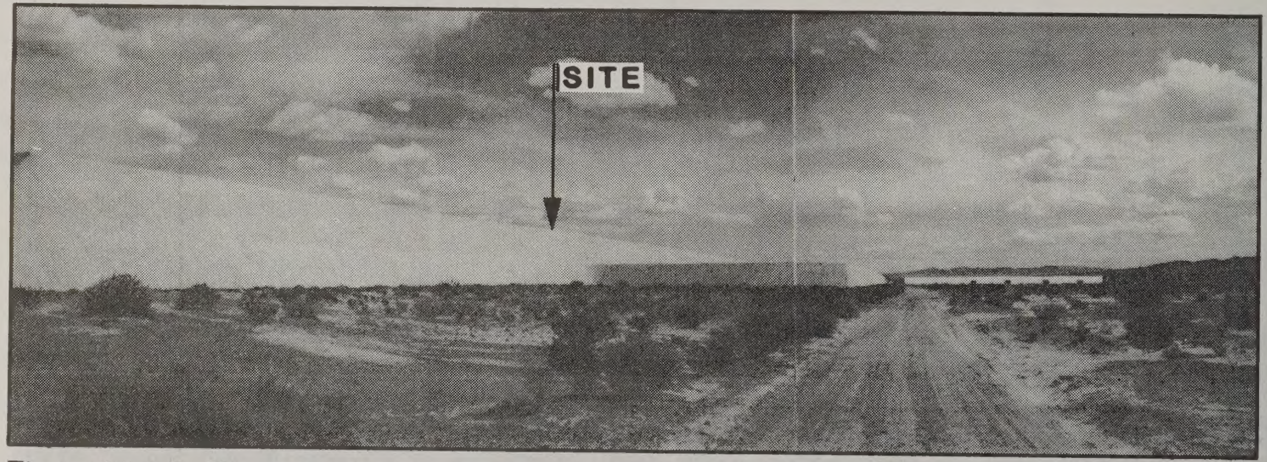


Figure 4.1.9-7 Viewpoint 3: After Project - Looking South From Crucero Road 200 Feet North of Proposed Project Site

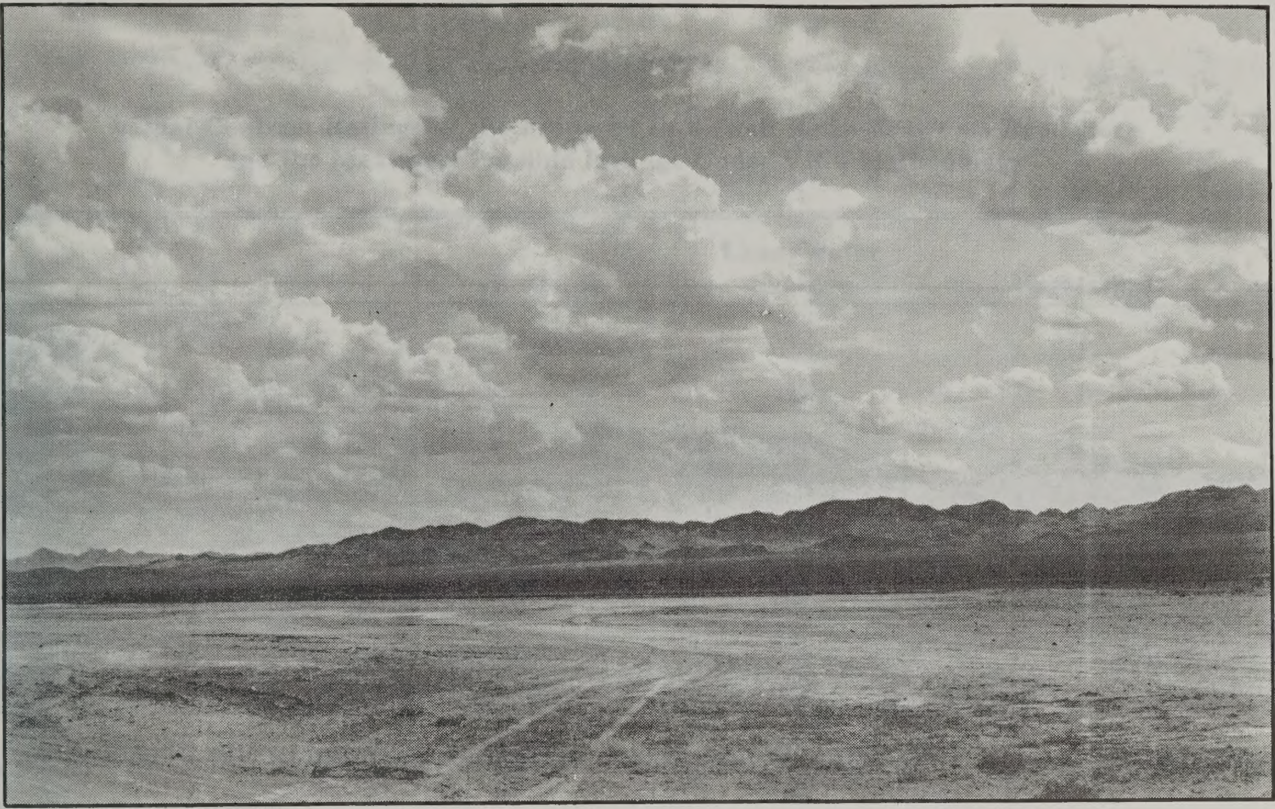


Figure 4.1.9-8 Viewpoint 4: Before Project - Looking South Across Broadwell Lake From North Edge of the Lakebed

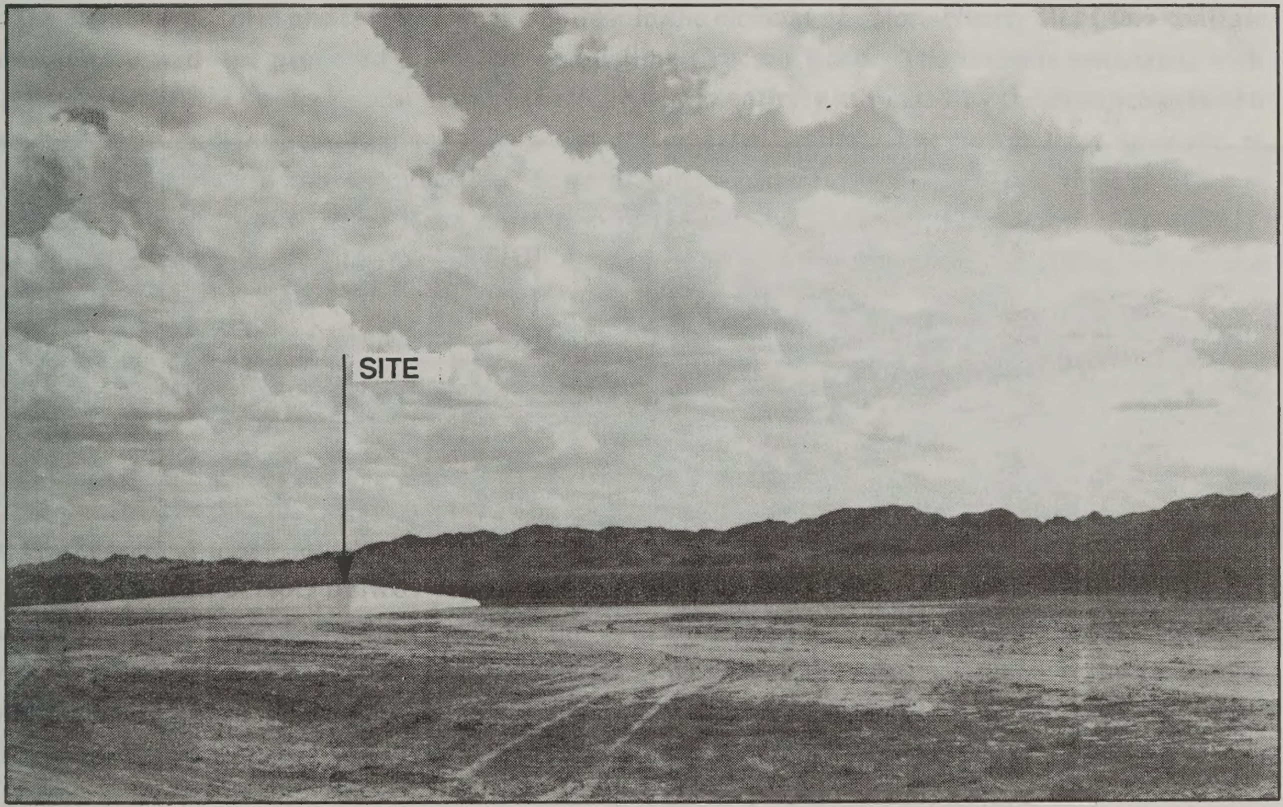


Figure 4.1.9-9 Viewpoint 4: After Project - Looking South Across Broadwell Lake From North Edge of the Lakebed

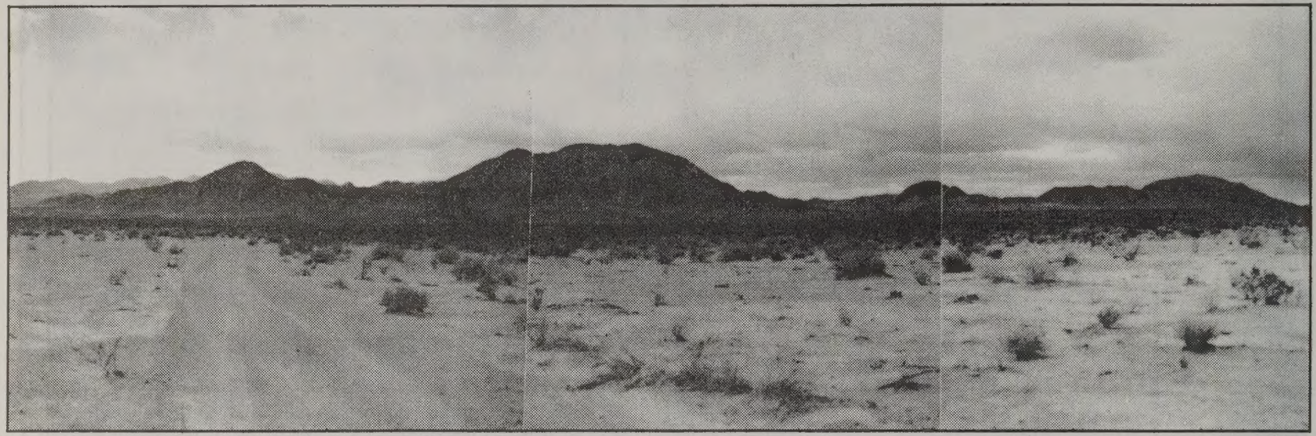


Figure 4.1.9-10 Viewpoint 5: Before Project - Looking Northwest Toward Coarse Borrow Area

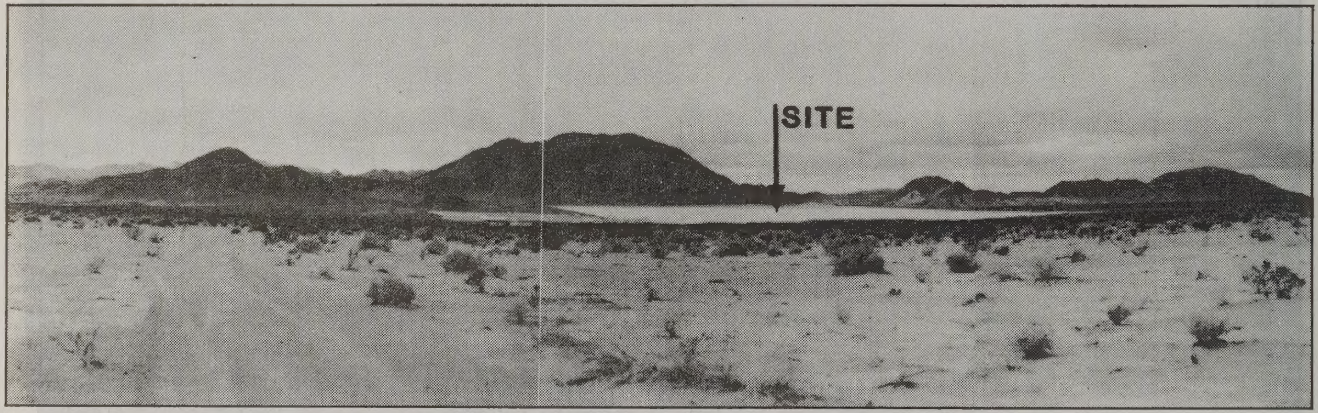


Figure 4.1.9-11 Viewpoint 5: After Project - Looking Northwest Toward Coarse Borrow Area

Table 4.1.9-1

Visual Contrast Ratings of the Proposed Broadwell Basin Residuals Repository and the Maximum Possible Ratings Under VRM Methodology

	Structure	Land/Water Surface	Vegetation
Viewpoint One (1)	16	12	8
Viewpoint Two (2)	9	12	8
Viewpoint Three (3)	23	23	12
Viewpoint Four (4)	13	15	12
Viewpoint Five (5)	22	26	16
Maximum Possible Rating*	30	30	30

Note: *Theoretical maximum for all VRM classes.

A separate discussion is warranted for each of the three landscape features -- structure, land/water surface, and vegetation.

For the structure feature, the overall contrast rating of 16 is the result of moderate degrees of contrast in the elements of form and line and weak contrast in the element of color. Nearly all of this contrast is associated with the proposed powerline parallelling Crucero Road. The impacts associated with proposed structures on the Repository site itself are nearly entirely mitigated by the distance between the viewpoint and the site -- more than seven and one-half miles. The power line, however, is proposed as a standard aboveground line. It would begin in the foreground of this view and follow the linear alignment of Crucero Road north toward the lake bed. As seen from Viewpoint One (1), the line of power poles would form a strong linear sequence. Such sequences can strongly draw the viewer's attention.

The analysis of the land/water surface feature includes the proposed Crucero Road improvements as a potential source of impact. The contrast rating for this feature is 12. The contrast would be seen and may begin to attract some attention. This level of impact is largely due to the proposed Crucero Road improvements. The improvements would create a lengthy, highly linear, visual feature moving down the long alluvial slope from Ludlow into the lake basin.

According to the proposed typical section, the Crucero Road right-of-way would be 60 feet wide with a 26-foot-wide paved roadbed in the center. Portions of the upstream slope at the road edge would be rip-rapped. The current unmaintained road is level with the existing terrain. It is clearly visible only in views such as Viewpoint One (1), which look directly down the road. In angled views, the undulations of the landscape together with the creosote scrub and other vegetation completely conceal the road. Paving the road would greatly increase its visibility.

The vegetation feature analysis is based on the assumption that some landscaping of a minimal nature would be done in the office area. According to EMCON Associates, however, this landscaping would consist primarily of native shrubs, with some palm trees possible. Significantly, the vegetation feature analysis is also based on the absence of the native vegetation, which would be removed, as necessary, for the development and as part of construction activities.

The overall contrast ratings for the vegetation feature is 8. Significantly, half of this is solely because of the color element. This is so for two reasons. First, any new landscaping has the strong potential to stand out in comparison to the dusky native vegetation. This effect -- common to desert landscapes -- is known as "greenscarring." Vegetation planted to soften the impacts of human landscape addition actually often increases visual contrast. Second, the removal of native vegetation would reveal large areas of light sand and gravel material. This would create significant color contrasts, particularly away from the light-colored lake bed. Areas of vegetation removal directly adjacent to the lake bed edge would be visually seen as part of the light-color lake bed when viewed from Viewpoint One (1).

Viewpoint Two (2). This viewpoint looks north from Interstate 40 at a point approximately 1.2 miles east of Ludlow. The raised lanes and railing of the westbound lanes are visible in the foreground. This view is generally typical of views from Interstate 40 east of Ludlow. As with Viewpoint One (1), this viewpoint is about eight and one-half miles from the proposed project site. Views of the site, while distant, are unimpeded.

Contrast Rating System scores for Viewpoint Two (2) are 9 for structure, 12 for land/water surface, and 8 for vegetation. Overall contrast totals in this range mean that the contrast of the proposed landscape addition would be seen but would not attract attention. As with Viewpoint One (1), the generally low contrast totals for Viewpoint Two (2) are largely a result of distance.

Comments about specific causes of visual contrast for Viewpoint Two (2) are very similar to those concerning Viewpoint One (1), with an exception of those addressing impacts associated with the proposed powerline. In Viewpoint One (1), the proposed powerline would begin in the foreground of the view and consequently would be the source of moderate contrast in the element of structure. In Viewpoint Two (2), the powerline would be, at its closest point, approximately 1.2 miles from the viewpoint. It would be minimally visible even under very clear conditions and is not a source of significant visual contrast. In summary, for Viewpoint Two (2), the structure contrast rating is the result of uniform weak contrast in the elements of form, line, and color. The vegetation feature impacts are created in large measure by color contrasts.

Viewpoint Three (3). This viewpoint is a broad panorama looking southwest, south, and southeast from a point on existing Crucero Road approximately 200 feet northwest of the proposed Repository. This viewpoint represents views with the highest possible impacts -- those immediately adjacent to the proposed development. The eventual 130-foot height of the disposal area would be highly visible. However, it should be noted that a limited number of observers would see the development from this vantage; dirt roads within the basin have few travelers.

Visual Contrast Rating System scores for Viewpoint Three (3) are 23 for structure, 23 for land/water surface, and 12 for vegetation. Overall contrast totals in this range mean that the proposed landscape addition would demand attention and would not be overlooked by the average viewer when seen from this viewpoint. Contrast ratings for each of the landscape features are discussed below.

The structure feature has an overall contrast rating of 23. More than half of this is visual contrast in the crucial element of form. The raised and starkly geometric forms of the Repository cells and buildings would contrast sharply with the uniform horizontality of the existing landscape. The existing landscape exhibits broad expanses with gradual, slow transitions from one type of landform to another. The few areas of abrupt visual transition, such as the dry lake bed edge, are visual attractants. The geometric forms of the Repository represent an abrupt transition of form, particularly as viewed from close proximity.

In addition, the waste receiving and storage buildings would be visible in this view, creating another visually similar source of visual contrast. The buildings are sited at the north end of a large bermed facilities area. The waste receiving and storage building would be between 15 and 20 feet high. It is proposed to be a metal frame and metal-sided building.

The land/water surface feature has an overall contrast rating of 23. The proposed project would demand attention and would not be overlooked by the average viewer. The visual contrast total is the result of contrast in the areas of form, line, and color. As with the structure feature, the geometric forms of the proposed development would be in strong contrast to the horizontal landscape. The angles of the Repository cells would create contrast in the line element. The color of the cover materials would also contrast with the existing natural colors.

The vegetation feature has an overall contrast rating of 16. It would begin to attract attention from the average viewer. As previously noted, the color of new landscaping has the potential to create the greatest visual contrast for the vegetation feature. The lack of vegetation where the project requires its removal also has the potential to create visual contrast.

In summary, contrast scores for the close views from Viewpoint Three (3) are substantial. The proposed development would demand attention and even dominate the landscape. As noted, however, an extremely limited number of observers would view the development from close vantages. Thus, while contrast totals are high, the number of potential viewers exposed would be very low.

Viewpoint Four (4). This viewpoint looks southwest across Broadwell Lake from a point less than one-half mile from the north edge of the proposed Repository.

Contrast Rating System scores for Viewpoint Four (4) are 13 for structure, 15 for land/water surface, and 12 for vegetation. Overall contrast totals in this range mean that the proposed landscape addition would attract attention and would begin to become a dominant landscape feature.

The purely geometric forms for the Repository cells and the buildings would contrast with the existing horizontal landscape features. The intervening one-half mile softens this contrast to a moderate level, but the development would remain a dominant landscape element.

The visual contrast of land/water surface would result primarily from the geometric forms of the development, together with the color contrast between the cover material and the surrounding natural ground surface.

The color of new landscaping has the potential to create substantial visual contrast.

Viewpoint Five (5). This viewpoint looks north and northwest from a point on Crucero Road at the intersection with the dirt access road leading to the Old Dominion Mine in the Cady Mountains to the west. It is approximately 1,800 feet south of the closest point of the proposed coarse borrow area.

The foreground of Viewpoint Five (5) is occupied only by low vegetation. This condition is typical of the situation throughout most of the basin and has virtually no visually obstructing effect for landform alterations on the scale proposed for the coarse borrow area. More distant viewpoints within the basin are likely to have similar minimal levels of foreground obstruction. Distant views along Interstate 40 tend to have little obstruction at all, except directly in the vicinity of Ludlow. In these middleground and background views, the vegetative cover on the borrow area site appears as a completely unremarkable part of the even vegetative pattern across the alluvial slopes of the entire basin.

Visual Contrast Rating System scores for Viewpoint Five (5) are 22 for structure, 26 for land/water surface, and 16 for vegetation. Contrast totals in this range mean that the landscape modifications would demand attention and would not be overlooked by the average viewer. These totals are to some extent the result of the close proximity of the viewpoint. As previously discussed regarding other viewpoints, increasing distance lowers visual contrast even in an open desert landscape.

For the structure feature, the overall contrast rating of 22 is the result of strong degrees of contrast in form and moderate contrast in line and texture. The coarse borrow area plans propose a considerable amount of structural elements. These include an office, equipment stall, crusher and screening plant, and conveyors. From relatively close vantages, such as those represented by Viewpoint Five (5), these structural components of the proposed borrow area are a strong source of visual contrast. In particular, their geometric and angular forms contrast strongly with the strong horizontality and irregular forms of the existing setting. Field examination of similar structures in desert settings indicate that their visual contrast declines quickly with increasing distance between site and viewpoint. From Interstate 40 and Ludlow, the proposed structures would have no or virtually no visual contrast even under the clearest atmospheric conditions and starkest lighting.

The visual contrast rating for the land/water surface feature is 26. This score is the result of strong degrees of contrast in the elements of form and color and moderate degrees of contrast in the elements of line and texture. This is a high degree of visual contrast; the landscape alteration would demand attention and would not be overlooked by the average viewer. The borrow area would strip an excess of 20 vertical feet of material from an area more than one-quarter mile square in size. Exposed 3:1 angle slopes around the perimeter of the borrow area would vary in height from 20 to more than 30 feet in height. A flat deck area would also be created to allow the creation of material stockpiles, and a 30-foot-wide haul road would be graded connecting to Crucero Road.

The form of the borrow area — a pit which is shallow but which extends over a large area — would contrast strongly with the visual character of the existing setting. The mining operation would also create strong visual contrast in the element of color because the subsurface material is considerably lighter in color than weathered and desert varnished surface material. Significantly, the site would be located on a pronounced alluvial slope, one which slants up and away from most viewpoints within the basin, including the important but distant viewpoints along Interstate 40 and at Ludlow. Strong color contrast over such an extensive area is a visual contrast source which distance does not easily mitigate. Unlike the structural components discussed above, the color contrast would remain a moderate source of visual contrast, even from viewpoints on Interstate 40 or in Ludlow on clear days.

The Contrast Rating for the vegetation feature is 16. The contrast would attract attention and may begin to be a dominant element within the overall scene. The removal of the native vegetation would create moderate degrees of contrast with the surrounding vegetated areas in the elements of line, color, and texture. The removal of vegetation would highlight the rectangular boundary lines of the proposed borrow area, would increase the color contrast created by the mining operation, and would cause a textural contrast between vegetated and unvegetated areas. These levels of contrast — particularly in line and color — would remain evident at moderate to weak levels even at distant viewpoints along Interstate 40 or at Ludlow.

Visual Resource Management Class Designations. The overall Broadwell Basin in the area of the proposed Residuals Repository site has been designated by the BLM as VRM Class IV. VRM Class IV is the least protected of the four VRM classes. BLM Manual 8430 (1984) outlines VRM Class objectives for Class IV areas: "The objective of this class is to provide for management activities which require major modification of the existing character of the landscape. The level of change to the characteristic landscape can be high. These management activities may dominate the view and be the major focus of viewer attention. However, every attempt should be made to minimize the impact of these activities through careful location, minimal disturbance, and repeating the basic elements."

There are some areas with Class III designations within the larger visual setting, although all such areas are a minimum of one and one-half miles from the proposed site. Primary among these for the purposes of this analysis is an approximate two-mile-wide corridor centered on Interstate 40. The proposed access road crosses this area. This corridor is so designated because of its foreground position relative to the important viewing corridor represented by the highway. Also designated Class III are some of the upper portions of the Cady Mountains to the west of the borrow site and some of the upper portions of the Bristol Mountains to the east of the site.

BLM Manual 8430 (1984) outlines VRM Class objectives for Class III areas: "The objective of this class is to partially retain the existing characteristic of the landscape. The level of change to the characteristic landscape should be moderate. Management activities may attract attention but should not dominate the view of the casual observer. Changes should repeat the basic elements found in the predominant natural features of the landscape."

The Repository and the coarse borrow area, as proposed, meet the VRM Class Objectives for the area. Both are proposed on a VRM Class IV area. In such areas, as fully outlined above, "the level of change to the characteristic landscape can be high." The objective of the class is to provide for management activities which "require major modification of the existing character of the landscape." The proposed borrow area would clearly result in such "major modification" of the existing character of the landscape.

However, the objectives for VRM Class IV also state that "every attempt should be made to minimize the impact of these activities through careful location, minimal disturbance, and repeating the basic elements." The mitigation measures below are recommended in keeping with this management objective.

The proposed access road and power transmission and telephone lines cross approximately one mile of VRM Class III area adjacent to Interstate 40. The level of change to the characteristic environment is moderate. These proposed landscape additions meet the Class III management objectives.

In the Initial Study prepared for the Broadwell Basin Repository, it was stated that the utility lines would be placed underground. Subsequently, the engineering design was revised to place the utilities on a powerline in the proposed right-of-way, adjacent to the road. The potential visual impacts of the aboveground utility line have been addressed in this document. The general conclusion of the visual analysis is that the aboveground lines do not conflict with the VRM goals in a Class IV visual setting.

However, the overall visual intrusion of the project can be reduced along the right-of-way by placing the utilities underground. If utilities are placed underground along the proponent's preferred road right-of-way, all elevated evidence of the access road would be eliminated.

A mitigation measure is provided below requiring that utilities be placed underground in order to reduce overall visual intrusion in Broadwell Basin.

The overall scenic quality of the Broadwell Basin is defined as lacking focus in this evaluation and it was identified as having "low" scenic quality in the BLM's original assessment of WSAs (BLM 1980, Volume B). Specifically, the BLM commented on the visual quality of WSA 252: "The mountainous portion received medium scores for all key factors, while the valley received low scores for landform, color, and vegetation and a medium score for uniqueness." The study area has an overall scenic quality of "low."

The Broadwell Basin Repository facilities, including the borrow sites, are within the viewshed of the following WSAs. In WSA 250 (west of the Bristol Mountains crest) the facilities are visible as foreground, middleground and background views. In WSA 256 the facilities are part of background views similar to those shown in Figure 4.1.9-5. In WSA 252 the facilities are part of foreground, middleground and background views. Some of the facilities are located on private land within WSA 252. In WSA 251 the facilities, except the coarse material borrow site, form part of the middle ground views that are visible from only the southeastern edge of the WSA. The coarse material borrow site is part of foreground views in WSA 251. In WSA 251A the only view is along a narrow view corridor through the narrow pass into Soda Lake Basin. The five visual simulations presented in this section are considered representative of the views that would be available from within the four WSAs in the viewshed of the proposed project.

Because of the low scenic quality that occurs in the valley portion of Broadwell Basin and the intrusion of other man-made features within the basin (power transmission lines, roads, the interstate highway, the community of Ludlow, and the railroad bed), the impact of introducing the proposed facilities (structures, Repository, and borrow sites) is not considered to be a significant degradation of the basin's existing visual setting.

4.1.9.3 Mitigation Measures

Mitigation measures are derived from the examination of the specific project visual impacts as determined in the preceding section. The format of this portion of the analysis is based on the three landscape features basic to the Visual Contrast Rating System methodology: structure, land/water surface, and vegetation. These mitigation measures shall be incorporated into the final design of the project facilities.

Structure.

V-1. Horizontal architectural elements shall be emphasized in all structures. Strongly vertical features shall be avoided.

V-2. Rooflines shall be strongly horizontal with nearly flat roof pitches.

V-3. A color palate based in earth tones indigenous to the area shall be employed for all structures. Main buildings shall be painted a uniform color. Color shall be selected to provide as little contrast as possible with existing natural colors. Paint used shall be a matt finish, oxidizing paint. Glossy paint finishes shall be avoided.

V-4. Dark or bright colors shall be avoided for structures, vehicles, and equipment except what is required by safety regulations.

V-5. Overly tall utility poles, signs, or light standards shall be avoided. Alternatively, the utility lines can be placed underground to avoid all visual intrusion of utility lines associated with the proposed project.

V-6. Exterior lighting shall be located and directed such that it is as concealed as possible when viewed from Interstate 40, the community of Ludlow, and the WSAs.

V-7. Visible retaining or other walls over 4 feet high shall be avoided unless visually integrated into building design.

V-8. Low, horizontal berming with maximum 5:1 slope shall be employed to conceal and soften visual impacts of parking areas.

V-9. Tinted windows shall be used to decrease reflectivity. Under no circumstances shall mirrored or silvered windows be used at the site.

V-10. Identifying signage at the entrance to Crucero Road at Ludlow shall be limited to 10 square feet and no more than 6 feet high.

V-11. Crusher and screening plant and conveyors shall be low profile equipment types.

Land/Water Surface.

V-12. Grading techniques for the raised facilities area shall emphasize slope contouring and variable slopes. Hard edges and angles are to be avoided; tops and toes of slopes shall be rounded.

V-13. Graded slopes shall be designed to blend smoothly with remaining existing topography.

V-14. Care shall be taken to minimize point erosion caused by drainage concentration, particularly along Crucero Road.

V-15. Crucero Road outside the area of the Broadwell Lake 100-year flood zone shall be elevated only where absolutely required for drainage, flood control, or other safety reasons.

V-16. Rip-rap color shall match as closely as possible the color of the existing landscape.

V-17. The slopes of the coarse and clay borrow areas shall be graded to final form as required by the reclamation plan covering those borrow sites. See the reclamation plan (Appendix F) for further discussion of this subject.

Vegetation.

V-18. Use of native plants shall be maximized to blend with the surroundings.

V-19. Removal of existing creosote scrub shall be minimized. Construction traffic and operations shall be strictly limited to clearly flagged roadways and areas.

V-20. Revegetation of the coarse borrow area shall occur as a part of implementation of the reclamation plan. For a further discussion of this item, see the reclamation plan (Appendix F).

4.1.9.4 Significant Unavoidable Adverse Impacts

Construction of the proposed facilities at Broadwell Lake and mining at the coarse borrow area would permanently alter the existing naturally appearing conditions within the overall basin. From the critical viewpoints in Ludlow and at various points along Interstate 40, the overall contrast of the development would be seen, but would not attract attention. The primary factor mitigating visual and aesthetic impacts of the proposed development is distance from significant viewpoints. The site is approximately eight miles from Ludlow and Interstate 40. With the implementation of mitigation measures, the management objectives of minimizing visual impacts would be met to a large extent. Visual impacts from the regional point of view would not be significant. Site or local impacts from Viewpoint Three (3) and Five (5) would still remain significant and unavoidable (Table 4.1.9-2).

Table 4.1.9-2

Visual Contrast Ratings of Broadwell Basin Residuals Repository With the Implementation of Proposed Mitigation Measures

	Structure	Land/Water Surface	Vegetation
Viewpoint One	16	9	6
Viewpoint Two	9	9	6
Viewpoint Three	23	23	12
Viewpoint Four	13	15	6
Viewpoint Five	22	26	10
Maximum Possible Rating[1]	30	30	30

Note: [1]Theoretical maximum for all VRM classes.

4.1.10 Transportation/Circulation

4.1.10.1 Criteria for Significance of Impact Determination

Impacts were considered significant if one or more of the following conditions would occur:

- Project-related traffic on public roads reduces the level of service (LOS) below minimum desirable design standards endangering public health and safety and requiring facility improvements at substantial risk;

- Access for emergency vehicles is obstructed;

- A major roadway or railroad is closed to all through traffic and no alternative route is available; or

- Peak period LOSs on County roads are reduced to D, E or F.

4.1.10.2 Impacts

The daily traffic generated by the facility is estimated to increase truck traffic by 80 to 200 trucks per day (10 to 25 ton/truck) and 20 cars from inspectors and employees. Peak hour traffic was estimated to be 20 inbound and outbound truck trips and 10 inbound and outbound employee vehicle trips. The distribution is based on the additional project-related traffic entering Crucero Road from the west and returning to Interstate 40 to the west at the Interstate 40/Crucero Road interchange.

The LOS analysis utilizing the *Highway Capacity Manual* (Transportation Research Board 1985) unsignalized intersection methodology indicated an LOS of A at the intersection of Crucero Road and westbound and eastbound Interstate 40 exit ramps. The increased peak hour traffic would not significantly affect the intersection.

The LOS analysis for the increased truck traffic of the proposed project for the various segments of Interstate 15 and Interstate 40 are shown on Table 4.1.10-1. The additional employee and truck traffic is converted to passenger car equivalency, varying for the different segments of freeway depending on the estimated grade of the roadway segment. In no case did the existing LOS change as a result of additional project-related traffic. Peak hour increased truck traffic is unlikely in the early morning and late afternoon hours. In most cases, the additional truck traffic in the urbanized areas would be going against the peak hour flow both in the early morning and late afternoon hours.

The transportation of hazardous wastes increases the risk of unintentional releases of these materials. The overall accident rate of a given road segment is an important consideration in the safe transportation of the shipments. The Southern California Association of Governments (SCAG) study *Southern California Hazardous Waste Management Project, February, 1985* confirmed that the freeway systems are by far the safest routes of travel for hazardous waste and that truck accidents are lower than all other types of roadway vehicle accidents. Hazardous waste trucks are subject to annual inspections by the California Highway Patrol, and responsible companies have maintenance and training programs.

4.1.10.3 Mitigation Measures

Because the traffic generated by the proposed facility would primarily be truck traffic, and the volumes generated would be low, Interstates 15 and 40, as well as the improved Crucero Road, would be able to operate with an adequate level of safety. Therefore, no mitigation measures are suggested.

4.1.10.4 Significant Unavoidable Adverse Impacts

No significant unavoidable adverse impacts are associated with the additional traffic generated by the project.

4.1.11 Land Use

4.1.11.1 Criteria for Significance of Impact Determination

Impacts on land use were considered significant if:

- Proposed project is inconsistent with the California Desert Conservation Area (CDCA) Plan (1980, as amended) and/or;

Table 4.1.10-1

Level of Service on Primary Access Roads With Additional Project-Related Traffic

Roadway	Segment	Lanes in Each Direction	Volume to Ratio Capacity(1)	Level of Service(2)
Interstate 15	Kenwood Avenue Interchange	4	1.17	F
Interstate 15	Oakwood Avenue Interchange	4	1.10	F
Interstate 15	Interstate 40 Ramp East Off Interstate 15 North	2	0.71	C
Interstate 40	Interstate 15 Ramp Off Interstate 40 West	2	0.34	A
Interstate 40	Crucero Road Interchange	2	0.24	A

Notes: (1)Volume-to-Capacity Ratio (V/C) - determined using 1985 Highway Capacity Analysis:
V/C = Directional Peak/[$C_j \times N \times F_{HV} \times F_W \times F_p$]
C_j = 2,000; capacity under ideal conditions
N = Number of lanes in one direction
F_W (Factor W) = Factor to adjust lane widths
F_p (Factor P) = Factor to adjust driver population
E_T (Truck equivalency) = Based on typical trucks 200 lb/IIP and estimate of grade.

(2)LOS = Level of service -
A = Free-flow operations; high average speeds and unimpeded maneuverability (V/C ratio < 0.35).
B = Reasonably free-flow operations; above average speeds and slight impacts on maneuverability (V/C ratio 0.35 - 0.54).
C = Stable operations, typically meets design standards: some speed restrictions as a result of congestion and noticeably restricted freedom to maneuver (V/C ratio 0.54 - 0.77).
D = Borders on unstable flow: speeds reduced by congestion and severely limited freedom to maneuver (V/C ratio 0.77 - 0.93).
E = Extremely unstable flow: virtually no usable gaps in the traffic stream to maneuver from one lane to another without causing disruption to traffic flow (V/C ratio 0.93 - 1.00).
F = Forced or breakdown flow: intermittent traffic stoppage in a lane and queues behind breakdown points (V/C ratio > 1.00).

Source: Caltrans 1989; Transportation Research Board 1985.

- Proposed project is inconsistent with the BLM's *Interim Management Policy (IMP) and Guidelines for Lands Under Wilderness Review* (1979) and/or;

- Proposed project is inconsistent with the goals, objectives, and policies of the San Bernardino County General Plan (1989), and/or;

- Proposed project is inconsistent with the San Bernardino County Hazardous Waste Management Plan (1990), and/or;

- Proposed project is located on federal public land within an established wilderness area or land designated as suitable for wilderness, and/or;

- Proposed project disrupts or divides the physical arrangement of an established community, and/or;

- Proposed project conflicts with established recreational, educational, religious, or scientific uses of the area, and/or;

- Proposed project converts prime agricultural land to non-agricultural use or impairs the agricultural productivity of prime agricultural land.

4.1.11.2 Impacts

A comparison of the proposed project with the pertinent goals, objectives, and policies of the County General Plan and Hazardous Waste Management Plan is presented in Table 4.1.11-1 to assess the consistency of the project with these plans. Only those policies of the General Plan that deal with land use issues are discussed here. A comprehensive review of all relevant General Plan policies is available in *Broadwell Basin Residuals Repository Land Use and Planning Issues*, submitted separately to the County in September 1990 (see one of the technical appendices to this document). Consistency with the County Hazardous Waste Management Plan is evaluated against the siting criteria for the establishment of a hazardous waste facility. In addition, potential impacts on WSAs and consistency with the CDCA Plan are discussed below.

The proposed Broadwell Basin Residuals Repository site would occupy Section 25, Township 9 North, Range 7 East on private land located partly within WSA 252. The entrance and treatment facilities would be on the edge of the Broadwell Lake playa and the proposed Residual Repository site would be on the surface of the playa, all of which are located on private land. Saleable minerals consisting of clay and coarse materials to be used for earthfill, aggregate, clay, and drain rock materials required for construction would be obtained from borrow areas on public land. The clay borrow area is on approximately 227 acres of public land in Section 30, Township 9 North, Range 8 East on land designated Class M. The borrow area is on the Broadwell Lake playa approximately 100 feet west of

Table 4.1.11-1

Consistency of the Proposed Project
With the Land Use Policies of the San Bernardino County General Plan
and the Siting Criteria of the County Hazardous Waste Management Plan

Policy	Project Impacts	Mitigation Measures	Consistency With Policy
County General Plan			
LU-1 • Limit development in areas with valuable natural resources and in hazardous areas.	• Some ecological sensitivity due to vegetation disturbance and suitable desert tortoise habitat.	• Proponent shall provide compensatory mitigation.	Yes.
LU-4 • Ensure compatibility with adjacent uses and control nuisances.	• Project is in existing General Plan map designation "Resource Conservation" which may be suitable for a land disposal facility for hazardous waste.	• Project is designed to ensure compatibility with adjacent land uses and siting requirements contained in Hazardous Waste Management Plan.	Consistent with Resource Conservation Official Land Use District (OLUD).
LU-5 • County will develop a priority application process for commercial and industrial development that would improve the County's job/housing balance.	• Project provides jobs.	• None required.	Yes.
LU-7 • Balance intensity of land use with availability of infrastructure and public facilities.	• New infrastructure and services would be needed by the project.	• Proponent shall provide all infrastructure facilities required to support its activities.	Yes.
LU-8 • Ensure development does not become a fiscal liability for County residents.	• The County would supply the following services: monitoring and inspection; fire protection and emergency services; limited road maintenance; and law enforcement.	• Taxes and fees paid by the Broadwell Project would produce a net annual recurring surplus ranging from $3,161,461 to $15,842,473.	Yes.
LU-10 • Coordinate with federal, state, and other agencies to minimize land use conflict.	• Project would affect BLM lands including Wilderness Study Areas. • Class M designation of CDCA allows multiple uses including mining and road development.	• BLM will review this project both as a permitting agency and a lead agency for EIS purposes.	Yes.
County Hazardous Waste Management Plan (siting criteria)			
1. Proximity to Residences:			
a. A 2,000-foot Buffer Zone.	• The nearest existing residences are eight miles south of the project site.	• Proponent has purchased or optioned the private land south of the project site for a minimum of 2,500 feet. All remaining adjacent land is publicly owned and not available for residential/commercial uses.	• Project meets the criterion.

Table 4.1.11-1, Page 2 of 4

Policy	Project Impacts	Mitigation Measures	Consistency With Policy
1. Proximity to Residences: (continued)			
b. Risk Assessment	• Potential for accident or adverse emissions from the proposed facilities is minimal.	• Proponent has submitted a public health risk assessment to the County.	• Proponent's action complies with the criterion.
2. Proximity to Immobile Populations.	• No immobile populations occur within eight miles of the project.	• No mitigation needed.	• Project meets the criterion.
3. Proximity to Public Facilities.	• Nearest public facilities are eight miles south of the project at Ludlow.	• Same as above.	• Project meets the criterion.
4. Provision of Public Services.	• Onsite drinking water, sewer, and emergency services needed. Adequate groundwater available for project use.	• Proponent shall develop water and sewer facilities and provide emergency response equipment and trained personnel.	• Proponent's action complies with the criterion.
5. Floodplain Areas.	• Project would be within the 100-year floodplain boundaries.	• Proponent shall construct 35-foot-high perimeter berm around the Repository. Crucero Road level shall be raised above the 100-year flood levels. Other flood control facilities shall be built to meet this criterion.	• Proponent's action complies with the criterion.
6. Proximity to Active or Recently Active Faults.	• Project site is not within 200 feet of an active or recently active fault.	• No mitigation needed.	• Project meets the criterion.
7. Unstable Soils.	• Project site is not located in areas of rapid geologic change. Desiccation cracks pose potential risk to project facilities.	• Proponent shall undertake standard engineering measures to control the potential for desiccation cracks to develop at the project site.	• Proponent's action complies with the criterion.
8. Depth to Groundwater.	• The depth to groundwater beneath the project site is 80 feet or greater. This depth substantially exceeds the Subchapter 15 requirements.	• No mitigation needed.	• Project meets the criterion.
9. Major Recharge Areas for Aquifers.	• Project is not in any regional aquifer listed in state, regional, or general plans. However, accidental releases from the facility are possible.	• Project is designed to prevent accidental releases.	• Project meets the criterion.
10. Permeability of Surficial Materials.	• Project is on a clay lake bed with a permeability between $1x10^{-5}$ and $1x10^{-9}$ centimeters per second. Subchapter 15 allows an engineered alternative for permeabilities exceeding $1x10^{-7}$ cm/sec.	• Proponent shall place two additional liners below the first two liners mandated by regulation to contain any spills and shall conduct adequate monitoring and inspection to ensure hazardous wastes are not released into the surrounding environment.	• Project engineered alternative meets the criterion.
11. Non-Attainment of Air Areas.	• Project would add pollutants in a designated non-attainment area for PM$_{10}$ and ozone.	• Proponent shall comply with all air pollution regulations of the San Bernardino County Air Pollution Control District.	• Proponent's action complies with the APCD regulations.

Table 4.1.11-1, Page 3 of 4

Policy	Project Impacts	Mitigation Measures	Consistency With Policy
12. Criteria Pollutants in Prevention of Significant Deterioration (PSD) Areas.	• Project would have no adverse impact on the nearest designated Class I area, the Joshua Tree National Monument, about 50 miles south of the project.	• Proponent shall control fugitive dust emissions to the extent possible. • Proponent shall institute preventive maintenance program for operating equipment. • Proponent shall establish an air toxics/meteorological monitoring program to gather data and to ensure the protection of health and safety of employees and the general public.	• Proponent's action complies with the criterion.
13. Wetlands.	• Jurisdictional wetlands have been identified on the site.	• Proponent shall comply with Section 404 permit requirements and Streambed Alteration Agreements.	• Proponent's action complies with the criterion.
14. Habitats of Threatened, Rare, or Endangered Species.	• Project does not affect any endangered species.	• A qualified biologist will resurvey the area for desert tortoises prior to construction. If tortoises are found, proponent shall provide compensatory mitigation in accordance with the agreements negotiated with the California Department of Fish and Game and the U.S. Fish and Wildlife Service.	• Proponent's action complies with the criterion.
15. Prime Agricultural Lands.	• No prime agricultural lands occur in the project area.	• No mitigation needed.	• Project meets the criterion.
16. Recreational, Cultural, or Aesthetic Resources.	• Project facilities are not in any known recreational area. Area receives low visitor use from dispersed recreationists.	• No mitigation needed.	• Project meets the criterion.
	• Crucero Road improvement would affect two historic sites potentially eligible for NRHP. Impacts to buried cultural resources possible during construction.	• Proponent shall take action to determine the eligibility of historic sites to NRHP. If found eligible, mitigation measures will be taken in consultation with the SHPO.	• Proponent's action complies with the criterion.
	• Broadwell Basin has been given no special designation for visual/aesthetic resources in any of the plans that pertain to this area. However, eventual configuration of the Repository would be visible to travelers on Interstate 40 and to visitors of the Broadwell Basin.	• Proponent shall take mitigation measures to reduce visual impacts of the project facilities as described in the Section 4.1.9.	• Proponent's action complies with the criterion.

Table 4.1.11-1, Page 4 of 4

Policy	Project Impacts	Mitigation Measures	Consistency With Policy
17. Areas of Potential Mineral Deposits.	• Project would not affect any state-designated mineral areas. However, the project would involve mining of substantial quantities of clay and aggregate material from areas on which unpatented mining claims exist.	• Proponent has applied for BLM permit to mine clay and aggregate material. Mineral rights to the claims would need to be relinquished by the claimant before a mineral materials sales could be authorized by the BLM.	• The site meets the criterion.
18. Military Lands.	• The proposed project is over nine miles from any military land and would not interfere with any military mission.	• No mitigation needed.	• Project meets the criterion.
19. Proximity to Areas of Waste Generation.	• Project is about 150 miles from major hazardous waste generators, yet close enough to generators in view of other siting criteria.	• No mitigation needed.	• Project meets the criterion.
20. Proximity to Major Transportation Routes.	• Project's primary access would be along two major interstate highways: Interstates 15 and 40.	• No mitigation needed.	• Project meets the criterion.
21. Minimize Transport Through Minor Routes.	• No local or residential streets need to be used to access the project site except Crucero Road, which passes along one residence and has no specific destination beyond the Repository.	• No mitigation needed.	• Project meets the criterion.

the right-of-way of the Tonopah and Tidewater Railroad, the west boundary of the Kelso Dunes WSA 250, and just east of the Repository site. The proposed clay borrow area is not within a WSA (Section 3.1.2, Figure 3.12-1).

The proposed coarse material borrow area is on approximately 363 acres of public land in Sections 14, 23, and 24, Township 9 North, Range 7 East on land designated Class M. The borrow area is on a bajada of the Cady Mountains in the Old Dominion Mine Area. The borrow area is not within any designated WSA; however, the Sleeping Beauty Mountain WSA 252 surrounds the borrow area from the northwest to the south. The existing route of travel, consisting of a unsurfaced road to the Old Dominion Road, forms the southern boundary of WSA 252 and is one of the two closest points between the borrow area and WSA at approximately 200 feet in Section 24. The other nearby WSA boundary is also approximately 200 feet away in Section 14. The distances between the WSA boundary and borrow site boundary vary greatly depending on location; the range varies from 200 feet to 1,900 feet or greater (Section 3.12, Figure 3.12-1).

Approximately six miles of existing Crucero Road would be improved and about two and one-half miles of new road west of the existing Crucero Road would be constructed to support projected truck traffic to and from the project site. Two lanes of paved road would be placed within a 60-foot wide right-of-way. The crossings over major streambeds would utilize hard surface dips.

The existing Crucero Road width from the undisturbed outer graded berm across the road to the other outer graded berm ranges from 30 to 32 feet along the proposed improved portion of the berm. With a planned right-of-way of 60 feet, a total of 64 acres of surrounding land would be disturbed as a result of road improvements.

The proposed improvement of the existing alignment of Crucero Road and construction of a section of relocated road would require right-of-way over public and private lands designated WSAs. The existing Crucero Road borders three WSAs: WSA 250, WSA 252, and WSA 256 (see Section 2.2, Figure 2.2-4). Starting from the south end near Ludlow, the Crucero Road in Section 32 borders WSA 256 (Bristol/Granite Mountain WSA) for 4,360 feet. However, all improvements are planned to be made on the west side of the road on lands outside the WSA and no impacts on WSA 256 are anticipated.

Along the next 5,280 feet of road adjacent to WSA 250, the additional road disturbance would also be undertaken on the west side of the road away from the WSA and no encroachment on WSA 250 would occur.

Along the 14,000 feet of road section between WSA 250 and 252, disturbance within WSA lands would be unavoidable. The proposed action would limit the disturbance to only one WSA (WSA 252), which has relatively lower ranking in terms of wilderness quality.

Beyond this point, the new relocated road planned to be built above the 100-year flood levels would encroach upon WSA 252 for an additional 8,500 feet. This improvement would include one major stream crossing structure and three minor crossings in Sections 6, 31, and 36.

In summary, the proposed project would encroach into WSA 252 on both public and private land. The proposed action for Crucero Road relocation veers onto public land in WSA 252 above the 100-year flood elevation contour. At the project site, the support facilities would be constructed on private land within WSA 252. Both borrow sites are located on public land outside of any WSA.

In the case of proposed development on both public and private lands, the encroachment is on the edge of the WSA adjacent to an existing road.

The fundamental question regarding significance in this instance is whether the proposed facilities would significantly impair wilderness values in WSA 252 and make it unsuitable for designation as wilderness by Congress. The net loss is less than 50 acres of public land and 340 acres of private land relative to 25,670 acres in WSA 252. The issue of impairment must be considered in light of the institutional/political concerns regarding the precedent of allowing development at the edge of, but within, a WSA.

The definition of wilderness in the Wilderness Act, section 2(c) states:

> A wilderness, in contrast with those areas where man and his own works dominate the landscape, is hereby recognized as an area where the earth and its community of life are untrammeled by man, where man himself is a visitor who does not remain. An area of wilderness is further defined to mean in this Act an area of undeveloped Federal land retaining its primeval character and influence, without permanent improvements or human habitation, which is protected and managed so as to preserve its natural conditions and which (1) generally appears to have been affected primarily by the forces of nature, with the imprint of man's work substantially unnoticeable; (2) has outstanding opportunities for solitude or a primitive and unconfined type of recreation; (3) has at least five thousand acres of land or is of sufficient size as to make practicable its preservation and use in an unimpaired condition; and (4) may also contain ecological, geological, or other features of scientific, educational, scenic, or historical value.

A man-made feature (Crucero Road) is already present at the edge of WSA 252. The Broadwell Basin Repository would increase the intensity of use along this boundary in an area generally identified as having low wilderness value. The construction of new relocated road would occur within 2,500 feet of the WSA boundary and the potential for wilderness experience in the core of the WSA would not be threatened by the proposed Broadwell Basin Project.

Because of the scale of the Broadwell Basin Repository project, approval to site and operate the facilities would commit the valley portion of Broadwell Basin to permanent improvements and long-term human influence.

Based on the analysis above, the project has the potential to affect WSA 252; that is, to further reduce its potential for being designated as wilderness by Congress. This may be a short-term impact because it appears unlikely that WSA 252 has the quality to justify wilderness designation. In addition, the encroachment on the WSA lands is consistent with the IMP, hence the impacts are not considered significant.

The proposed road improvement would not displace any residences; however, the route would pass by one residence on Crucero Road, which is not considered a significant land use impact. The road improvement would not conflict with established recreational, educational, religious, or scientific uses in the area nor would any conversion of prime farmland or the disruption of any existing or proposed grazing allotment occur. The placement of electrical distribution and telephone lines within the proposed right-of-way of the Crucero Road improvement is also consistent with the CDCA Plan.

The right-of-way and associated road and electrical distribution lines encroach upon the height limit of the existing clear zone at the west end of the airstrip at Ludlow. Because the west end of the runway is less than 100 feet from the existing Crucero Road, the proposed alignment would result in the future truck traffic and distribution line violating the required clear zone height restrictions of less than five feet at that distance, and would be inconsistent with Policy AV-1 of the Aviation Safety overlay of the San Bernardino County General Plan. This would cause a significant impact that must be mitigated.

Unpatented claims have recently (1989) been filed on public land throughout the Broadwell Lake playa by Santa Fe Pacific, Inc. The mineral rights to the mining claims located in Section 24, Township 9 North, Range 8 East on the proposed coarse materials borrow site and in Section 30, Township 9 North, Range 7 East on the proposed clay borrow site would have to be relinquished by the claimant before a mineral materials sales could be completed.

4.1.11.3 Mitigation Measures

L-1. The proponent shall reclaim the coarse and clay borrow areas as required by an approved reclamation plan, to leave those sites amenable to future uses, as further discussed in the reclamation plan (Appendix F).

L-2. The applicant shall minimize the land required for road improvement within the WSAs.

L-3. Existing Crucero Road within the airport clear zone shall be excavated to a depth of about 10 feet, or relocated in a manner whereby the trucks will comply with the clear zone height restrictions.

L-4. The utility lines within the airport clear zone shall be placed underground or relocated to comply with the clear zone height restrictions.

L-5. The proponent shall resolve the existing mining claims issue before a mineral sales could be completed.

4.1.11.4 Significant Unavoidable Adverse Impacts

Although the land disturbance in WSA 250 and 256 has been entirely avoided, disturbance in WSA 252 is unavoidable but not considered significant.

4.1.12 Public Health and Safety

This section presents an assessment of the public health risks potentially presented by implementation of the proposed project and the impact on emergency response services which respond to potential accidents and spills.

4.1.12.1 Criteria for Significance of Impact Determination

Two important measures or parameters for describing the impact of a source of carcinogenic emissions are the maximum individual cancer risk and the maximum population excess cancer burden. The maximum individual cancer risk is the estimated probability of a potential maximally exposed individual contracting cancer as a result of exposure to carcinogenic air contaminants over a period of 70 years. The maximum population excess cancer burden is the upper-bound estimate of the increase in cancer cases in a population as a result of exposure to a carcinogen. It is the product of the number of people exposed and the individual risk to that population.

There are no *de facto* standards for individual cancer risk or maximum population excess cancer burden. The EPA considers an individual risk range of 1 in 10,000 to 1 in 10 million (1×10^{-4} to 1×10^{-7}) to be acceptable. The Food and Drug Administration has banned food additives and drugs in meat and fowl if the residuals would result in a risk greater than 1 in 1 million (1×10^{-6}) of causing tumors. The California Department of Health Services (DHS) requires remedial action when the estimated individual risk exceeds 1×10^{-6} for contamination of drinking water by pesticides, organic solvents, and other chemicals. The South Coast Air Quality Management District's (SCAQMD) new source review of carcinogenic air contaminants (Rule 1401) states that a permit to construct a new, relocated, or modified facility that emits any carcinogenic air contaminant would be denied if any of the following risks occur:

- A maximum individual cancer risk greater than 1×10^{-6} at any receptor location, if the facility is constructed without best available control technology for toxics (T-BACT).

- **A maximum individual cancer risk greater than 1 in 100,000 (1 X 10^{-5}) at any receptor location, if the facility unit is constructed with T-BACT.**

- **Greater than 0.5 excess cancer cases in the population subject to a risk of greater than 1 X 10^{-6}.**

Although the SCAQMD Rule 1401 has not been adopted by the San Bernardino County Air Pollution Control District (APCD), for the purpose of this report, a maximum individual cancer risk level greater than 1 X 10^{-6} is considered as a significant public health impact. Public safety impacts would be considered significant if emergency response services were not adequate to meet project-related emergencies.

4.1.12.2 Impacts

Risk Assessment. The evaporative emissions from the Broadwell Basin Repository discussed in Section 4.1.7.2 would be the principal toxic contaminants which may reach potential receptors through inhalation exposure pathways. Direct inhalation of particulate matter containing trace metals would not be likely because only negligible amounts of fugitive dust would escape from the disposal cell or the stabilization facility (see Section 4.1.7.2). Also, ingestion and dermal absorption would not be likely exposure pathways for the evaporative emissions. Of the organic emissions shown in Table 4.1.7-3, benzene and hydrocarbons (gasoline vapors) are classified as potential human carcinogens. Benzene would be emitted from the disposal cell and would be contained in the gasoline vapors that are emitted from the storage tank. Hydrocarbons would be emitted from fuel storage tanks. The emission rates for these compounds are presented in Table 4.1.7-3.

A cancer risk assessment was performed for the facility to evaluate the impacts of the benzene and hydrocarbon emissions on public health (Brown and Caldwell 1990; available as technical appendix). All models were run in a screening mode. This means that the impacts were analyzed for a standard combination of wind speeds, wind directions, and mixing heights which are selected to maximize the modeled concentrations. The use of the screening mode results in overestimates of concentrations, particularly for longer averaging periods. Maximum cancer risk assessments were made for both the residential and employment (worker) populations. For workers, an exposure of eight hours per day and 240 days per year was assumed. The life of the project was assumed to be 20 years. The maximum lifetime cancer risks were adjusted for this shorter period of exposure. The combined results of the risk calculations for benzene and hydrocarbons are presented in Table 4.1.12-1. The contribution of hydrocarbons to cancer risk is negligible and is not shown separately.

The nearest population to the project site is at Ludlow, approximately 13,400 meters (approximately eight and one-half miles) south of the project. At Ludlow, the individual lifetime (70 years) cancer risk would be 4.6 in a million while the risk for the life of the project (20 years) would be 1.3 in a million. The individual worker cancer risk for a 20-year exposure would be 0.289 in a million. For

Table 4.1.12-1

Calculated Individual Cancer Risk for Benzene and Hydrocarbons (Combined) at Various Distances from Property Line and for 70-Year and 20-Year Exposure Periods

Population	Exposure	Distance from Property Line (meters)		
		100	500	1,000
Residential	70-year	14.290 X 10^{-6}	12.660 X 10^{-6}	11.130 X 10^{-6}
Residential	20-year	4.082 X 10^{-6}	3.618 X 10^{-6}	3.179 X 10^{-6}
Employment	20-year	0.898 X 10^{-6}	0.796 X 10^{-6}	0.699 X 10^{-6}

Population	Exposure	Distance from Property Line (meters)		
		2,500	5,000	13,400
Residential	70-year	8.765 X 10^{-6}	6.999 X 10^{-6}	4.608 X 10^{-6}
Residential	20-year	2.504 X 10^{-6}	2.000 X 10^{-6}	1.317 X 10^{-6}
Employment	20-year	0.551 X 10^{-6}	0.439 X 10^{-6}	0.289 X 10^{-6}

Source: Brown and Caldwell 1990.

a 20-year exposure, the population excess cancer burden (assumed population of 100) would be 0.013 in a million and for a 70-year exposure, 0.046 in a million.

Within a one-mile zone around the project property line, the estimated individual cancer risk for the worker would be 0.9 in a million at the 100-meter distance, and 0.7 in a million at the 1,000-meter distance. These levels represent the potential cancer risk should commercial development be allowed to occur within the one-mile zone.

The Proposition 65 exposure limits were evaluated for both Ludlow and the one-mile zone. Benzene would be the only one of the four volatile organic compounds emitted from the Repository that is listed as a Proposition 65 compound. Air modeling calculations indicate that at Ludlow the benzene exposure would be 17.4 micrograms per day (μg/day) (Brown and Caldwell 1990). This value is greater than the Proposition 65 level of significance, which is 7 μg/day. At the point of maximum concentration (100 meters from the property line) the calculated amount of benzene that a worker would be exposed to would be 18.0 μg/day. This value is also greater than the Proposition 65 level of significance. Based on these calculated exposure levels, the Proposition 65 warning would be required.

However, since the individual cancer risks (70-year and 20-year) in the Ludlow area would exceed the one in a million (1 X 10^{-6}) criterion for significance, the public health impacts of the project would be significant, if no mitigation measures are applied.

Emergency Response Services. Conceivable emergencies include fire, flooding, earthquakes, worker injury, transport accidents, or spills of hazardous materials. Since no fire-fighting units are available in the immediate vicinity of the project, the facility would maintain limited onsite fire-fighting capability to deal with a structural fire. Site vehicles would be equipped with fire extinguishers. A 20,000-gallon water supply tank on the site would provide water to meet the general fire control demands. The residues in large part are non-combustibles and the surrounding desert does not contain sufficient vegetation to present a substantial wildland fire hazards. The facilities would be designed to withstand floods and earthquakes. A thorough check of facilities after such events as well as periodic monitoring would prevent serious emergency situations. Minor injuries to workers would be treated on the site. Sick and injured persons would be transported to Barstow or other medical facilities, if an emergency arises.

Because of the generally solid nature of the residuals, any spills would have very limited mobility. The emergency response would, therefore, be limited to control of material spread by wind, vehicle, or foot traffic until such time as it was cleaned up. The Interagency Response team is responsible for minimizing exposure of the public to any health hazards. Depending on the size of the spill, the team may undertake the removal of the hazardous material on their own or may call in a contractor to undertake the removal and cleanup effort.

According to data kept by the California Highway Patrol and the San Bernardino County Department of Environmental Health Services, accidents involving treated solid hazardous waste (not loose powders) pose the least health threat because they do not migrate from the point of release and are relatively easy to clean up and remove from the spill location. Based on total mileage driven to deliver wastes to the Repository for disposal, approximately two and one-half accidents may be expected over a 50-year period.

The pit areas of the coarse and clay borrow sites could potentially become safety hazards if not properly dealt with at the end of project operations.

4.1.12.3 Mitigation Measures

P-1. The mitigation of adverse public health impacts would be directed toward reducing the organic evaporative emissions from the Repository cell. This shall be accomplished by the application of a vapor-suppressing foam or its equivalent as the waste is placed in the

Repository. Stabilized foam can suppress organic vapor emissions at 80 to 90 percent effectiveness for several days.

P-2. Because the risk assessment estimates are based on modeling calculations which have many uncertainties in their results, an air toxics sampling program shall be conducted to establish the level of ambient air toxic concentrations existing in the Ludlow area at the present time. After the facility begins operations, an air toxics sampling program shall be conducted over a minimum period of one year to ensure the protection of the health and safety of both onsite personnel and the offsite general public.

P-3. The proponent shall contribute funds for an emergency response unit in Newberry Springs to enhance ambulance or emergency response team capabilities along the affected portion of Interstate 40.

P-4. The Broadwell Corporation shall maintain cleanup capability at the site to handle spills on its property and on Crucero Road.

P-5. Normal industrial health and safety practices shall be employed in the operations of the Repository. Personnel shall be trained to use monitoring and personnel protective equipment appropriate to the highest degree of hazard the allowable residuals can present. Protective equipment available at the site shall include respiratory (dust) filters, gloves, boots, and eye glasses.

P-6. The borrow sites shall be reclaimed and closed, which will include signs and/or fencing, as well as 3:1 final slope angles, to mitigate any public safety concerns, as discussed in more detail in the reclamation plan (Appendix F).

P-7. Broadwell Corporation shall submit a spill prevention contingency/business plan to the County.

4.1.12.4 Significant Unavoidable Adverse Impacts

Application of mitigation measures would provide a significant reduction in organic vapor emissions and would reduce individual cancer risk levels for benzene below the 1×10^{-6} level. An air toxics sampling program would also ensure and verify that the ambient air toxic concentrations resulting from facility emissions are below levels that would produce individual cancer risk levels greater than 1×10^{-6}. Therefore, the use of mitigation measures would ensure that no significant unavoidable adverse public health impacts would occur as a result of the operation of the Repository. The provision of emergency response services necessary for the safety of workers and the general population would further reduce unavoidable adverse impacts to a level of non-significance.

4.2 IMPACTS OF ALTERNATIVE 1 (ALTERNATE REALIGNMENTS OF CRUCERO ROAD IN SECTION 5)

This section presents the impacts resulting from the use of alternative alignments of Crucero Road versus the use of its existing alignment in Section 5 immediately north of the community of Ludlow. The two alternative alignments are referred to as Alternative 1A for the north-south alignment 1,700 feet west from existing Crucero Road, and Alternative 1B for the north-south alignment about 2,700 feet west (along the section line between Sections 5 and 6) of existing Crucero Road. Environmental impacts at the proposed Repository site and other activity areas are not repeated.

4.2.1 Geology

Neither of the two road realignments would generate additional impacts to geologic resources, such as known mineral deposits in the area. Geologic hazards, such as active faults, landslides, flooding, rapid erosion, and sedimentation, would not affect the road alignments.

4.2.2 Soils

Both road realignments for Alternative 1 parallel each other and Crucero Road. The impacts of these realignments to soil resources would be the same as described for the proposed action except for the additional area disturbed for road improvement/construction. For the realignment closest to Crucero Road (Alternative 1A), approximately three additional acres would be disturbed. For Alternative 1B, five additional acres would be disturbed. During road construction, dust would be generated. This would be a short-term effect because the road would be asphalted to support heavy trucks. No wind erosion would result from the use of either realignments.

Impacts as a result of Alternative 1 would not be very different to those described for the proposed action. There would be a slight increase in area disturbed from the road realignment and the amount of soil lost to wind erosion. Any wind erosion would be a short-term impact mitigated by watering or oiling down the exposed soil until asphalt is applied.

4.2.3 Hydrology

The hydrological impacts of Alternative 1 would not be materially different from those described for the proposed action. The potential for flood damage would slightly increase because portions of the proposed road alignments in Section 5 would be within the 100-year flood zones. To avoid disruption to project-related traffic, the road would be constructed above the 100-year flood levels in the area; however, temporary disruptions during rains and heavy floods could occur.

4.2.4 Noise

The change in alignments of Crucero Road proposed by this alternative would not noticeably change the noise levels resulting from the proposed action (see Section 4.1.4). There could be a slight reduction in noise to a residence on Crucero Road because project-related traffic would turn left prior to reaching the house instead of passing in front of the house, as would be the case for the proposed action. However, this would be replaced by impacts to a mobile home located at the intersection of National Trails Highway and Alternative 1A road alignment. The noise impacts resulting from this alternative would not be significant.

4.2.5 Biological Resources

Field surveys conducted by Tierra Madre Consultants (1989, 1990) were reviewed for vegetation descriptions within the alternative alignments of Crucero Road. Creosote bush scrub is the dominant plant community in the region and also occurs along the alternative alignments. About three to five acres of additional land would be disturbed by Alternatives 1A or 1B. The net impacts of Alternative 1 would be slightly higher than those identified for the proposed action.

No threatened or endangered plant or wildlife species would be affected by this alternative. Impacts on biological resources would not be significant.

4.2.6 Cultural and Paleontological Resources

Historic cultural materials were encountered during a field survey along a drainage channel close to Alternative 1A. The materials within the drainage are redeposited materials from the historic deposits of Ludlow and are of no significance in their current location. However, the potential for significant buried deposits exists in the area. A cultural resource monitor should be present during road construction to evaluate the significance of buried deposits, if found. In summary, with a slight increase in newly disturbed areas, impacts of Alternative 1 on cultural and paleontological resources would be marginally greater than those identified for the proposed action.

4.2.7 Air Quality

There would be a slight increase in the length of travel (about one mile) for project-related trucks and employee/visitors vehicles. However, the increase is not sufficient for air quality impacts to be different from those described for the proposed action.

4.2.8 Water Supply

Adoption of Alternative 1A or 1B road alignments would not change the impacts as described for the proposed action.

4.2.9 Scenic/Visual Resources

The visual resource impacts of adopting the Alternative 1A or 1B alignments would be almost the same as those for the proposed action.

4.2.10 Transportation/Circulation

The implementation of alternative road alignments would increase the length of travel by about one mile each way. The trucks and employee/visitor vehicles would avoid traveling in front of the one single-family residence a few feet north of the intersection of Crucero Road and National Trails Highway because the traffic would turn left onto National Trails Highway. However, this would be replaced by impacts to a mobile home located at the intersection of National Trails Highway and Alternative 1A road alignment. Overall impacts on traffic would not be different from those identified for the proposed action.

4.2.11 Land Use

The Alternative 1A road alignment is approximately 0.3 mile west of the existing Crucero Road, following National Trails Highway. The route is open space land containing only the inactive Ludlow Field recreation area and undeveloped open space, except for the residence near the intersection of the proposed road alignment. The residence is a mobile home with equipment storage and outbuildings. The remaining land within the right-of-way of Alternative 1A is undeveloped open space. Alternative 1A is not within the clear zone of the existing airport, and would be consistent with the Aviation Safety Element of the County General Plan and Federal Aviation Administration (FAA) regulations.

The Alternative 1B road alignment would be constructed in the same manner as Alternative 1A, except the north-south alignment of the road would be along the section line (between Sections 5 and 6). This alternative would result in the truck traffic passing the mobile home; however, the residence is set back from the highway more than the other existing residence on Crucero Road. The Alternative 1B road alignment would be developed entirely over undeveloped open space.

The Alternative 1B alignment would allow for the extension of the existing air strip and comply with the Aviation Safety Element of the General Plan and FAA regulations.

4.2.12 Public Health and Safety

The selection of Alternative 1A or 1B road alignments would not change the public health and safety impacts as described for the proposed action.

4.3 IMPACTS OF ALTERNATIVE 2 (IMPROVEMENT OF EXISTING CRUCERO ROAD)

Alternative 2 proposes to keep all road improvements along the existing Crucero Road alignment. Realignment of the road outside the 100-year flood levels as planned under the proposed action would not take place. Instead, the existing road would be elevated a maximum of 13 feet for a distance of about two and one-half miles to remain above the 100-year flood levels. The elevated portions of the Crucero Road would require an 88-foot-wide right-of-way. Approximately a three-mile portion of Crucero Road bordering on WSAs 250 and 252 would be constructed with a 44-foot-wide right-of-way instead of a 60-foot right-of-way envisaged under the proposed action. The impacts of Alternative 2 are described only to the extent they are derived from the changes in road improvements over those described for the proposed action. Impacts of the proposed action, if not changed by this alternative, are not repeated.

4.3.1 Geology

With this alternative, the disturbed area within the proposed right-of-ways would be increased to approximately 75 acres compared to 71 acres for the proposed action. This increase in acreage would not materially change the potential impacts from geologic hazards such as seismicity, subsidence, or desiccation cracks compared to those generated by the proposed action.

4.3.2 Soils

With an increase of about four acres of soil disturbance compared to the proposed action, the potential for wind erosion would not materially change. The elevation of existing Crucero Road above the 100-year flood levels south of the Repository site would require about 250,000 cubic yards of coarse material. However, a similar reduction in the requirements of construction material would occur because the proposed realignment of Crucero Road identified under the proposed action would not take place and a portion of the road right-of-way would be reduced from 60 feet to 44 feet.

4.3.3 Hydrology

The hydrological impacts of Alternative 2 would not be substantially different from those described for the proposed action. The potential from flood damage would slightly increase because portions of the road would be built within the 100-year flood zone.

4.3.4 Noise

The impacts of this alternative would be almost similar to those identified for the proposed action. Slightly higher noise levels may be experienced from the elevated roadway over a portion of the Alternative 2 alignment.

4.3.5 Biological Resources

With an increase of about four acres of land disturbance compared to the proposed action, impacts on biological resources would be slightly increased. Overall impacts would be almost similar to those for the proposed action.

4.3.6 Cultural and Paleontological Resources

With the elevation of existing Crucero Road, the need for realignment of Crucero Road identified under the proposed action would be eliminated. Consequently, disturbance to a possible historic site (remains of a single room) would not occur. With the elimination of new road alignment and reduction in the proposed right-of-way from 60 feet to 44 feet for a portion of the road, the potential for disturbing buried prehistoric, historic, or paleontological resources would be further reduced. In summary, impacts of Alternative 2 on cultural and paleontological resources would be relatively lower than those identified for the proposed action.

4.3.7 Air Quality

The slight increase in land disturbance along most of Crucero Road and increased earth-moving activity associated with the elevation of a portion of Crucero Road above the 100-year flood levels would result in a slight increase in air pollution during the short construction period. The overall impacts on air quality resulting from road improvements would not be materially different from those identified for the proposed action. Impacts from other project features would remain the same as for the proposed action.

4.3.8 Water Supply

Impacts on water supply under this alternative would be similar to those identified for the proposed action.

4.3.9 Scenic/Visual Resources

The visual resource impacts of adopting Alternative 2 would be slightly greater than those from the proposed action because of the visibility of elevated roadway over a portion of the Alternative 2 alignment.

4.3.10 Transportation/Circulation

Impacts on traffic volumes would not be different from those identified for the proposed action. However, a portion of the right-of-way under this alternative would be narrower (44 feet) than that planned under the proposed action (60 feet), increasing the potential for accidents. It must, however, be noted that even the narrower right-of-way would meet the current San Bernardino County standards and no significant impacts are expected.

4.3.11 Land Use

This alternative includes improvement of existing Crucero Road to current San Bernardino County standards; that is, two 13-foot wide paved sections and five feet of shoulder on each side of the road for a total minimum width of 36 feet. For impact analysis purposes, it is assumed that a 44-foot-wide area would be disturbed compared to a 60-foot right-of-way planned under the proposed action. This alternative would substantially reduce encroachment into the Sleeping Beauty WSA (WSA 252), but would not avoid it totally. Disturbance in WSAs 250 and 256 would be completely avoided by widening the road only on the west side of the existing alignment. Along the 14,100 feet of road section between WSAs 250 and 252, a maximum of 14 feet would be disturbed within WSA 252.

At the north end of this section of road, the existing Crucero Road dips below the 100-year flood elevation. In order to provide access under all weather conditions, this road would be elevated at least 13 feet above the lake bed. To construct a 36-foot wide and 13-foot high road section, the footprint of the disturbed area at ground level would be 88 feet wide (assuming 36-foot road section plus 26 feet on each side of the road with a slope of 2:1). For a distance of approximately 0.25 mile (1,320 feet), this would result in an additional disturbance of 1.9 acres within WSA 252. Beyond this point, all of the remaining 12,140 feet of the elevated road section can be located on the lake bed, east of and outside WSA 252. Total additional disturbance along this portion of the road alignment encompasses about 17.3 acres. Once Crucero Road reaches Section 25 (privately owned), it would be realigned to skirt the perimeter of the facility, heading west and then north until rejoining the original alignment.

In summary, this alternative can be developed in a manner that would reduce the overall acreage of encroachment into WSA 252 compared to the proposed action. Although Alternative 2 requires an 88-foot width within the 100-year floodplain, and this increases encroachment on WSA 252 for a quarter-mile length, the lengthier section of the road (about three miles) between WSA 250 and 252 has a decreased width of 44 feet only. Based on the location and type of encroachment at the edge of WSA 252, it does not appear that substantial impairment of wilderness values would occur. In addition, the encroachment on WSA lands is consistent with the IMP; hence the impacts are not considered significant.

4.3.12 Public Health and Safety

The overall public health and safety impacts of the project under this alternative would be similar to those identified for the proposed action.

4.4 IMPACTS OF ALTERNATIVE 3 (RAIL HAUL OF WASTE TO THE REPOSITORY)

This section provides a review of the potential adverse environmental impacts which could occur if 80 percent of the hazardous waste material brought to the Repository is hauled by railroads. Impacts of Repository construction and operations are similar to those for the proposed action and are not repeated here.

4.4.1 Geology

Additional land would be disturbed by installing railroad tracks from Ludlow to the Repository. The railroad bed would be raised above the surrounding topography and would increase the degree of topographic alteration into the facility. Erosion and sedimentation potential would be increased along the track, which is assumed to require a totally new alignment, outside of the Crucero Road disturbed area. No increase in other geologic hazards or impacts is expected.

Transfer-loading facilities at various locations in Southern California would have to be constructed at locations and in a manner that would not cause exposure to significant geologic hazards.

4.4.2 Soils

Assuming a 30-foot-wide disturbed area for a railroad bed and 10 miles of new track, an additional 36.4 acres of soil would be disturbed and removed from productivity. The elevated railroad track would require an estimated 150,000 cubic yards of material to construct the track (assumes fill material is equal to five feet high, 15 feet wide, and 52,800 feet long). The net impact on soils would be increased both from direct loss due to covering the soil and from additional mining of material from the coarse material borrow site. Soil erosion from wind would increase as a result of increased mining activity.

Transfer-loading facilities at various locations in Southern California could cause the additional loss of soil productivity by potentially overcovering several acres of soil at the sites selected.

4.4.3 Hydrology

The railroad tracks would cause a minor increase in runoff along its whole route from Ludlow to Broadwell. The facilities required to control drainage would be increased substantially because the railroad bed would act as a drainage barrier. Required drainage facilities could include storm control berms extending to the west, which would be designed to direct flows to culverts and drainage channels beneath the tracks.

Transfer-loading facilities at various locations in Southern California would cause local increases in runoff, none of which are projected to cause significant adverse impacts. The increased runoff would contribute to cumulative storm runoff increases and reductions in recharge at locations where constructed.

4.4.4 Noise

Installing railroad tracks to the project site would double the construction noise and introduce another major noise source into the Broadwell Basin. Assuming one to two train trips to the Repository from Ludlow each day (an estimated 40 rail cars), the noise level would remain about the same as projected for the proposed project (all truck trips to the Repository would not be eliminated under this alternative as indicated in Chapter 2.0). An additional type of noise source beyond those already identified would be added to the basin.

Depending upon location, the transfer-loading facilities would increase noise from increased truck traffic (delivering wastes), transfer and loading activities, and possibly from additional trains into the affected area.

4.4.5 Biological Resources

Based on the field surveys conducted for the project area and assuming a 10-mile route from Ludlow to the Repository and a disturbed area 30 feet wide, an additional 36.4 acres of habitat would be permanently eliminated. Other impacts would remain relatively the same.

Depending upon location, the transfer-loading facilities in the Los Angeles Basin could adversely affect biological resources if undisturbed sites are selected for these facilities. Because these facilities are likely to be constructed near existing railroad tracks, the potential for significant biological resource impacts is low, but it does exist.

4.4.6 Cultural and Paleontological Resources

The additional ground disturbance from constructing the railroad bed could expose more cultural resources to disturbance. Mitigation measures identified to ensure protection of cultural resources would be extended to the additional disturbed area.

Depending upon location, the transfer-loading facilities could adversely affect cultural resources if undisturbed sites are selected for these facilities. The potential for avoidance is high and impacts to both cultural and paleontological resources can be mitigated.

4.4.7 Air Quality

The intuitive reaction to railhaul is that it should reduce air emissions from transport of wastes to the Broadwell Basin Repository. A detailed comparison with the offsite emission forecast for the proposed project is not possible because the same level of detailed data is not available. However, a general comparison can be made based on railhaul emission data contained in the Los Angeles County Solid Waste Management Department's Draft EIR *Integrated Solid Waste Management System for Los Angeles County.*

One of the sites considered in the air emission forecast by Los Angeles County was the Rail-Cycle project, located near Amboy, which is about 30 miles east of Ludlow. Based on the air emission data provided in the Los Angeles County document, the air emission projected for the railhaul of waste to Broadwell Repository shows a 36 percent reduction from emissions resulting from trucking. This represents a substantial reduction for the operation period. Short-term construction emissions would be expected to increase by approximately 25 percent due to construction of the railroad tracks from Ludlow to the Repository site.

4.4.8 Water Supply

The addition of a railhaul alternative would increase the short-term use of water for dust control and construction purposes. The long-term water consumption remains unchanged.

Development and operation of the transfer-loading stations would increase the demand for water by a few hundred gallons per day at other locations. No significant impacts are forecast for these facilities based on the small quantity of water required to support such a facility.

4.4.9 Scenic/Visual Resources

The extension of a railroad track on a separate alignment along Crucero Road would substantially increase the changes in Broadwell Basin's visual setting. The railroad track would establish another disturbed corridor that would be visible from Interstate 40 as well as from within the adjacent WSAs. A separate alignment for the track would result in the visual disturbance extending into one or more WSAs and reducing the visual quality within these areas relative to the existing setting or the setting projected for the proposed action.

The transfer-loading stations would alter visual settings at the locations selected for them. The potential for significant impact is low based on the assumption that such facilities would be located within urbanized areas with similar structures.

4.4.10 Transportation/Circulation

The implementation of railhaul access to the Broadwell Basin Repository would reduce the amount of facility-related truck traffic on Interstates 15 and 40 and on Crucero Road by about 80 percent. It would increase the number of trains on the Santa Fe track system to Ludlow by one or two trains per day, depending on the nature of the waste. Approximately 40 railroad cars would be required to transport 1,600 tons of waste per day assuming 40 tons of waste is carried in each car. Note that some cars may be loaded with substantially less material because of incompatibilities with other wastes. The impact on traffic would be less. Some reduction in truck traffic (64 to 160 trips per day, depending on the size of the truck) on Los Angeles Basin freeways may also accrue from this option.

Alternatively, local circulation impacts may be significant at locations selected for transfer-loading stations depending upon the locations selected and the status of the existing circulation systems adjacent to the stations. Mitigation is generally available to reduce traffic impacts to local circulation systems, but may be very expensive.

4.4.11 Land Use

With one exception, railhaul to the Repository does not alter the land use effects of the proposed project. The one exception is the intrusion into at least one WSA with a major transportation system component. The railroad would create a separate alignment within WSA 252. The establishment of a railroad line through the WSA would significantly diminish wilderness values and would be an unavoidable significant adverse impact, at least until Congress determines which WSA will become Wilderness Areas.

Siting transfer-loading stations in urbanized areas may create very significant local land use conflicts depending upon the sites finally selected.

4.4.12 Public Health and Safety

The railhaul alternative does not affect the onsite public health and safety issues. Generally, by increasing the number of times the waste must be handled (three times), the risk of accidental spills is increased. The railhaul alternative would reduce some of the traffic and safety hazards from local roads.

The potential health and safety hazards in areas hosting transfer-loading stations would be increased. Because this increase in health and safety hazards can occur in areas with residential populations and on local roads, the hazards are considered greater than those posed by the proposed project.

4.5 IMPACTS OF ALTERNATIVE 4 (REPOSITORY WITHOUT ONSITE TREATMENT FACILITY AND REDUCTION IN DAILY WASTELOAD)

This section presents the impacts of a reduced flow of waste materials to the Repository and the elimination of the onsite treatment facility. The impacts are described as changes over those identified for the proposed action. Impacts of the proposed action, if not changed by the alternative action, are not repeated.

4.5.1 Geology

The reduction of waste to be deposited at the Repository from 2,000 tons to 1,000 tons per day would not alter the impacts on geologic resources (such as known mineral deposits in the area). The reduction in waste handling would only increase the active life of the Repository. The treatment facility creates a demand for about 57 percent (40,000 gallons of the 70,000 gallons required daily) of long-term water consumption. Without the treatment units, water consumption would be reduced by 57 percent over the life of the facility.

4.5.2 Soils

With the elimination of the onsite treatment facility, the total disturbed area from project construction would be reduced by about 20 acres. Consequently, wind erosion from soil disturbance during construction would not be as high as that resulting from the implementation of the proposed action. Long-term demand for clay and coarse materials would remain the same, but a reduction would occur in the daily and annual disturbance of soils resulting in lower soil erosion impacts.

4.5.3 Hydrology

With the elimination of the onsite treatment facility, the potential for damage to project facilities from flooding would be slightly reduced. The risk of materials escaping through spills, leaks, or ruptures would also be reduced because handling of materials for treatment would be avoided.

4.5.4 Noise

Noise levels at all project sites (entrance area, Repository, clay and coarse material borrow areas) and on access roads would be marginally reduced as a result of reduction in waste handling from 2,000 tons to 1,000 tons per day. While the noise levels generated by individual trucks, waste handling equipment, and mining machinery would remain at the same level as for the proposed action, the reduction in cumulative impacts of operating a smaller number of trucks and equipment would be perceptible in the project vicinity. Noise levels that result at the treatment facility from the dumping and screening process, loaders, bulldozers, dump trucks, miscellaneous diesel equipment, and conveyers would be totally eliminated.

4.5.5 Biological Resources

With the elimination of onsite treatment facilities, the total land area disturbed by the project would be reduced by 20 acres. Annual acreage of land disturbed at the clay and coarse material sites would also be reduced as the waste handled at the Repository is reduced from 2,000 tons to 1,000 tons per day. This reduction in disturbed area would result in lower impacts on biological resources. The ultimate land disturbance at the borrow sites would remain the same as for the proposed action but would occur over a much longer period (50 years for Alternative 4 versus 20 years for the proposed action), resulting in lower impacts on the annual disturbance of biological resources in the project area.

4.5.6 Cultural and Paleontological Resources

The elimination of the onsite treatment facility would reduce the total land disturbed at the Repository site by 20 acres. Although no cultural resources were recorded on the surface, there is a potential for buried sites along the Pleistocene lakeshore where the proposed treatment area would be located. With the elimination of the treatment facility, the potential for damage to buried cultural resources would be reduced. Long-term impacts related to other project areas would remain the same as identified for the proposed action, although these impacts would occur over a longer period of time as the active life of the Repository increases from 20 years under the proposed action to 50 years under Alternative 4.

4.5.7 Air Quality

The air quality impacts of Alternative 4 would be substantially lower than those from the proposed action. This would occur as a result of reduction in total annual emissions both from trucks hauling the waste to the Repository and machinery and equipment use at the Repository and the clay and coarse material borrow areas. The number of haul trucks would be reduced by 50 percent (from an estimated maximum of 200 trucks per day under the proposed action to 100 trucks per day under this alternative) as a result of reduction in daily waste handled at the Repository. This would result in corresponding reductions in annual/daily emissions along the highways and access road to the Repository. Further reductions in pollutant emissions would occur at the Repository site as a result of the elimination of the onsite treatment facility, and at the borrow sites from reduced demand for clay and coarse material on a daily basis.

4.5.8 Water Supply

The demand for water under Alternative 4 would be substantially reduced from that required under the proposed action. Total water demand under the proposed action is estimated at 70,000 gallons per day, of which 40,000 gallons per day would be required by the treatment facility. With the elimination of the treatment facility, the demand for water would be reduced by 40,000 gallons per day. Further reductions in demand would occur as the amount of waste handled at the Repository is reduced from 2,000 tons to 1,000 tons per day. Less water would be required under this alternative than under the proposed action for dust suppression at the Repository site, the clay and coarse material borrow sites, and on the access roads on an annual/daily basis. Because project water needs would be met by groundwater pumping, the lower pumping rate would cause fewer adverse impacts on the local aquifer than would occur under the proposed action.

Under this alternative, the operating life of the project would be increased from 20 years to 50 years. Over a 20-year period, the cumulative consumption would be 1,600 acre-feet (70,000 gallons per day or 80 acre-feet per year). Over a 50-year period, the cumulative consumption at 30 acre-feet per year (30,000 gallons per day) would be 1,500 acre-feet. Thus, the potential impact of the 50-year operating scenario is less adverse than the 20-year scenario. This becomes even more pronounced when the additional 30 years of recharge is taken into consideration.

4.5.9 Scenic/Visual Resources

The long-term scenic/visual resource impacts of adopting Alternative 4 would be almost the same as those for the proposed action. Even through the annual disposal rate at the Repository is reduced to half of the proposed action rate, the capacity of the Repository and its final shape remain the same as for the proposed action. The treatment facility eliminated under this alternative would not be visible to the travelers on Interstate 40 or to the casual observers in the project vicinity.

4.5.10 Transportation/Circulation

With a reduction of waste handling at the Broadwell Repository from 2,000 tons to 1,000 tons per day under this alternative, the impacts on the transportation/circulation system would be substantially reduced. The daily average traffic generated by the project would be reduced to 40 to 100 trucks per day from 80 to 200 trucks per day estimated for the proposed action. This would reduce the needed maintenance on Crucero Road because wear to the road surface would be potentially reduced. Traffic on Interstate 40 would not be noticeably changed and no change in level of service is expected. The risk of unintentional releases of hazardous materials from potential traffic accidents would be reduced as only treated waste would be transported to the Repository and the number of trucks per day would be reduced.

4.5.11 Land Use

Land use impacts of Alternative 4 would be similar to those identified for the proposed action. Although a reduction in annual waste handling would occur, the capacity of the Repository would remain the same. This would increase the active life of the Repository, but the total land disturbed by project-related facilities (road improvements, Repository facilities, and clay and coarse material borrow areas) would remain almost the same as under the proposed action. The only exception would be a reduction of about 20 acres required for the treatment facility, which would not be built under this alternative.

4.5.12 Public Health and Safety

The maximum individual cancer risk and the maximum population excess cancer burden associated with emissions from the Repository would not change substantially from those identified under the proposed action. These risks are calculated over the long-term (50 to 70 years). Additionally, the rate of emissions from the Repository site would not be substantially different from that estimated for the proposed action. Risk from accidental releases of hazardous materials resulting from potential traffic accidents would also remain the same, although it would be spread over a longer period of time.

There is a potential for increased health risks from possible illegal dumping of hazardous materials by haulers if the wasteload brought to the Repository is found to be unacceptable and the haulers are required to take the waste back to the source. The Repository is required to notify the Department of Health Services and the California Highway Parol if the wasteload is rejected as unacceptable for disposal at the Repository. Even though the stiff fines imposed for illegal dumping would minimize this potential, the need for a greater vigil by the California Highway Patrol would remain.

4.6 IMPACTS OF THE NO-ACTION ALTERNATIVE

The No-Action alternative is defined as not approving the Broadwell Corporation's application for a General Plan Amendment and issuance of a Conditional Use Permit to construct the proposed facility nor the issuance of right-of-ways and mineral material permits. If the proposed project is not implemented, the adverse environmental impacts identified for the proposed action in Section 4.1 would not occur and the existing conditions as described in the Environmental Setting sections of Chapter 3.0 would continue to prevail.

With the implementation of the No-Action alternative, the current needs of San Bernardino County and the Southern California region for disposal of hazardous waste would not be met and siting of other facilities at alternative locations would become imperative. This may result in loss of potential jobs and economic benefits to the County if a site is selected outside the County boundaries.

4.7 ENVIRONMENTALLY SUPERIOR ALTERNATIVE

CEQA requires identification of the environmentally superior alternative among other alternatives if the "No-Project" alternative is also the environmentally superior alternative. NEPA calls for the identification of the agency's preferred alternative or alternatives, if one or more exists. In compliance with these requirements, the proposed action and its alternatives were analyzed and it was concluded that none of the alternatives, including the proposed action, can be considered to be the environmentally superior alternative in its entirety. Instead, the environmentally superior alternative would be a combination of Alternatives 1, 2, and 4. This includes:

- Construction of the access road in Section 5 to the west of the existing Crucero Road alignment to avoid conflict with airport clear zone restrictions.

- Constructing the access road north of Section 5 along the existing Crucero Road alignment. The road would meet existing County standards and minimize encroachment into WSA 252.

- Construction of a Repository without treatment facilities on the site.

- Reduction of wasteload from 2,000 tons to 1,000 tons per day.

However, this combination of alternatives results in other constraints which include the following:

- Construction of a Repository without a treatment facility on the site would reduce certain impacts at the site, but would impose environmental impacts and risks on other, potentially more populated areas if needed treatment capacity is sited elsewhere. It could also prolong adverse environmental impacts occurring at older treatment facilities, many of which are located in urban areas with greater health risk exposure than that posed by the proposed Broadwell Basin project.

- Constructing the access road along the existing Crucero Road minimizes encroachment on WSA 252. However, the road as proposed, which enters WSA 252 in order to avoid the 100-year floodplain, would be superior because it could be built at-grade instead of being elevated to avoid flooding. The elevated road would disturb an 88-foot-wide right-of-way instead of a 60-foot right-of-way and would generate greater visual and noise impacts than the road planned under the proposed action.

4.8 CUMULATIVE IMPACTS

The discussion of cumulative impacts in this document includes the existing, proposed, or reasonable foreseeable projects in the general vicinity of the Broadwell Basin Residuals Repository. The existing projects are represented by the description of existing conditions in the various sections of the Environmental Setting (Chapter 3.0). Cumulative impacts are discussed in terms of project impacts in combination with other concurrent developmental activities.

Defining the scope of a cumulative impact discussion for each environmental issue is based on the inherent limits of the issue being evaluated. Thus, for groundwater issues at Broadwell Basin, the fact that it is an internally drained basin and apparently isolated limits the scope of cumulative impact discussion to the basin. In other words, water consumption demand outside of the basin does not contribute to the cumulative effect on water resources of concern in this document. Alternatively, the scope of cumulative impact discussion for traffic extends to the roads used by the proposed project, including Crucero Road, Interstate 40, and Interstate 15.

The existing environmental setting and the scope of the cumulative evaluation for individual issues are summarized below to assist the reader with understanding the cumulative impact forecast in this section.

Geology and Soils

Geologic impacts are seldom cumulative in nature, except for ground disturbance and related changes in surface runoff and erosion. The Repository site has been evaluated as not being subject to fault rupture, slope failure, liquefaction, or volcanism. The site and proposed facilities would be exposed to regional seismic hazards. The scope of cumulative seismic exposure encompasses the whole desert, and the entire state. The potential for subsidence and erosion has been evaluated as nonsignificant in the basin, which is the appropriate scope for these issues. No other activities occur in Broadwell Basin that can contribute to cumulative erosion, but the limited existing disturbance area (Crucero Road and the access roads along the power and natural gas transmission lines) is exposed to erosion. No evidence of erosion from these existing facilities was identified during field investigations.

Hydrology

There are no existing water production facilities within the Broadwell Basin. The only potential sources of water pollution are the facilities and activities in Ludlow (no man-made water degradation has been observed to date) and occasional visitors to the basin. Water quality is poor within the basin based on well samples taken to date, but the poor quality is due to natural circumstances (accumulation of salt), not human activity. With the exception of Ludlow, Interstate 40, and the narrow unpaved road lineaments throughout the Basin, all surface runoff is natural at the present time.

Noise

The only permanent man-made sources within the basin at this time are the electric transmission lines, vehicles on Interstate 40, trains on the Santa Fe railroad tracks, and activities in Ludlow. Periodic noise is generated by visitors or travelers through the basin and by aircraft overflights. The appropriate scope of cumulative noise impacts is the noise sources in the basin that can contribute to background noise within audible range of the project.

Biological Resources

The only existing disturbances to the natural habitat in the basin are the result of transportation facilities (roads, railroad, aircraft landing strip), the natural gas and electricity transmission lines, and the few mine locations. The basin's natural habitat is relatively undisturbed, but several sensitive animal species do inhabit the basin. The appropriate scope of cumulative impact evaluation is the whole desert where the plant habitat and sensitive species occur.

Cultural and Paleontological Resources

In most instances cultural and paleontological resource impacts are cumulative in a traditional sense. To the degree that the data obtained from identifying and analyzing these resources contribute to the total body of knowledge regarding past environments and their inhabitants for all mankind, these resources experience cumulative impact. The Broadwell Basin contains important historical resources (the Tidewater and Tonopah Railroad track alignment and Ludlow) and paleontological resources. Prehistoric resources discovered to date are very limited. With the exception of the few man-made facilities and activities previously discussed, no other activities are known to have affected these resources.

Air Quality

Air quality in the basin has both a local and regional component. The regional component consists of secondary air pollutants (ozone and aerosol particulates) transported into the basin and locally generated primary emissions. The major local emissions in the basin are fugitive dust, primarily from natural sources, and mobile source emissions from trains and vehicles that utilize the transportation corridor through Ludlow. Cumulative impacts must be assessed at both the basin and regional level for the different pollutants.

Water Supply

Similar to hydrology issues, cumulative water supply issues are restricted to the basin. Some minor water production may occur in Ludlow, but in general, no other water production is known to occur within the basin.

Scenic/Visual Resources

Like air quality, scenic and visual resources have a local and regional component. The local component is the basin, from the center to the ridges that bound internal views. Man-made alterations do occur throughout this basin, ranging from narrow, unpaved roads and small mines to electrical transmission lines to the community of Ludlow and related highways and railroad tracks. The majority of the basin is undisturbed at this time. The regional visual setting consists of the series of mountains and valleys that the traveler passes through from the north side of the San Bernardino Mountains to Needles. The cumulative change caused by man in the visual setting along this transportation corridor has been substantial and is increasing. The Broadwell Basin Repository project should be evaluated in this context.

Transportation/Circulation

The point of cumulative traffic evaluation is the interstate highway, which provides access to the project site and the off- and on-ramps (stop sign intersections) in Ludlow, which provide access to Crucero Road. Traffic flow on Interstate 40 is defined as very good and the intersection capacity is better than adequate. Projects that would increase traffic on the interstate or at the Crucero Road/ Interstate 40 intersections would contribute to cumulative impacts.

Land Use

The cumulative scope for land use is defined by the land use plans and the demand for the land use. The plans (County and BLM) define the acceptability and suitability of the project for the site selected. The site is suitable and acceptable according to both plans, but the proximity to WSA creates issues of concern. The need for the project is defined by the wastes being generated in San Bernardino County and Southern California in general (note that a project proposing to serve a larger market would rely upon demand from the anticipated market area). The government and proponent waste generation and need studies have identified a need for a regional Repository facility with treatment capacity. The proposed project has been designed to fit this role. The cumulative land use impact would focus on the consequences of constructing more than one facility in the region and what market these facilities would serve.

Public Health and Safety

The cumulative scope of public health and safety is defined by the areas and populations exposed to risks from operating the proposed facility. For example, cumulative traffic accident risk is the existing risk combined with the increased risk created by the project and other projects that would use the same road system. The traffic accident risk on the access roads has been evaluated as being nonsignificant. Risks from operating and disposing of hazardous wastes extend to the nearest population in Ludlow exposed to site-generated health hazards. This risk has been determined to be nonsignificant with mitigation. Other projects that would add to this risk define the cumulative context for evaluating this issue.

From this generalized discussion, it is clear that not all environmental resources affected by the proposed project are likely to experience cumulative impacts on the area-wide basis. The resources which may have cumulative impacts on the area-wide basis include:

- Biological resources (particularly desert tortoise habitats)
- Air quality
- Transportation/circulation
- Land use (particularly WSAs).

Other environmental resources considered for impact analysis of the proposed action would have localized or site-specific impacts with little or no impact on an area-wide level. These resources (geology, soils, hydrology, noise, cultural and paleontological resources, water supply, scenic/visual resources, and public health and safety) are not evaluated in this section.

The evaluation of potential cumulative impacts is presented in two sections. Section 4.8.1 provides a brief description of other projects considered for cumulative impact analysis (Broadwell Basin Repository description is not repeated). Table 4.8-1 summarizes known major projects within the general vicinity of the proposed Repository. Figure 4.8-1 gives general location of these projects. Section 4.8.2 provides an analysis of the potential cumulative impacts of these projects on selected environmental resources.

4.8.1 Project Descriptions

Hidden Valley Residuals Repository

Hidden Valley Resources, Inc. (HVR) proposes to build a Residuals Repository 10 miles northwest of the Broadwell Basin Repository site in an area known as Hidden Valley in the Cady Mountains, approximately 10 miles from Hector in San Bernardino County, California. The proposed facility would consist of a receiving area covering approximately 28 acres, several large underground storage areas, unpaved access roads to storage areas, and a 10-mile road and rail access from Hector to the facility site. It is estimated that the facility would receive and transfer approximately 30 to 50 rail cars and 10 to 15 truck loads of materials per day. The containment/storage area would be developed on a phased basis at a projected rate of approximately 5 to 10 acres per year.

Development of the project is proposed in two phases involving private lands that total approximately 1,300 acres with an estimated storage capacity of 120 years. The facility and the right-of-way across public lands are within the Cady Mountains WSA 251.

Tactical Vehicle Trail

The Naval Facilities Command, Western Division, proposes to build a road or trail from the northern boundary of Twentynine Palms Marine Corps Air-Ground Combat Center (MCAGCC) to the railhead at Manix, California. The trail would be located at a distance of 16 to 24 miles west of the Broadwell Basin Repository site. The road/trail would be approximately 25 miles long and 100 meters wide and would be ungraded except where needed to prevent offsite erosion or generation of dust. Two 20-acre vehicle staging areas would be built along the length of the road. The road would be used by military vehicles ranging from individual tactical vehicle "sorties" to several hundred tracked and wheeled tactical vehicles for 10 to 14 days, four or five times per year. A full environmental impact statement is being prepared for this project. With the exception of a few parcels of private lands, the trail would be built mostly on public lands administered by the BLM.

Table 4.8-1

Selected Characteristics of Projects Considered for Cumulative Impact Analysis

Project Characteristics	Broadwell Basin Repository	Hidden Valley Repository	Tactical Vehicle Trail	Hector Mine Expansion	Ft. Cady Mining Project	Rail-Cycle Landfill	Low-Level Radioactive Waste Facility
1. Project location (see Figure 4.8-1)	Broadwell Dry Lake	Hidden Valley	Between Ft. Irwin and Twentynine Palms MCAGCC	4 miles west of Pisgah Center	Adjacent to Hector Mine	6 miles west of Cadiz	North end of Ward Valley
2. Distance from Broadwell site (miles)	0	10	16-24	24	24	53	85
3. Total project area (acres)	970	3,500-11,500	1,000	139.33	945	4,480	960
4. Total disturbed area (acres)	970	1,530	1,000	139.33	578	1,900	100
5. Total BLM land involved	590	100-8,000	950	139.33	N	1,280	960
6. Road construction/ improvement (miles)	8.5	11	25	NA	NA	2	NA
7. Production/disposal capacity (tons/day)	2,000	1,200	N	NA	90,000	21,000	NA
8. Truck traffic (number/day) (10 to 25 tons/truck)	80-200	10-15	N	NA	NA	N	2-3
9. Rail cars (number/day)	N	30-50	N	NA	NA	840	N
10. Water requirements (gallons/day)	70,000	NA	NA	NA	450,000	NA	NA
11. Number of employees (number)	35	36-60	NA	NA	NA	39-134	21
12. Nearby communities (miles)	Ludlow (8.5); Newberry Springs (40)	Newberry Springs (15); Barstow (35)	N	Ludlow (16); Newberry Springs (17); Barstow (35)	Ludlow 16; Newberry Springs (17)	Ludlow (45); Cadiz (6); Amboy (8)	Needles (22.5); Essex (18); Goffs (12)

NA = Not Available or Not Applicable
N = Not Applicable

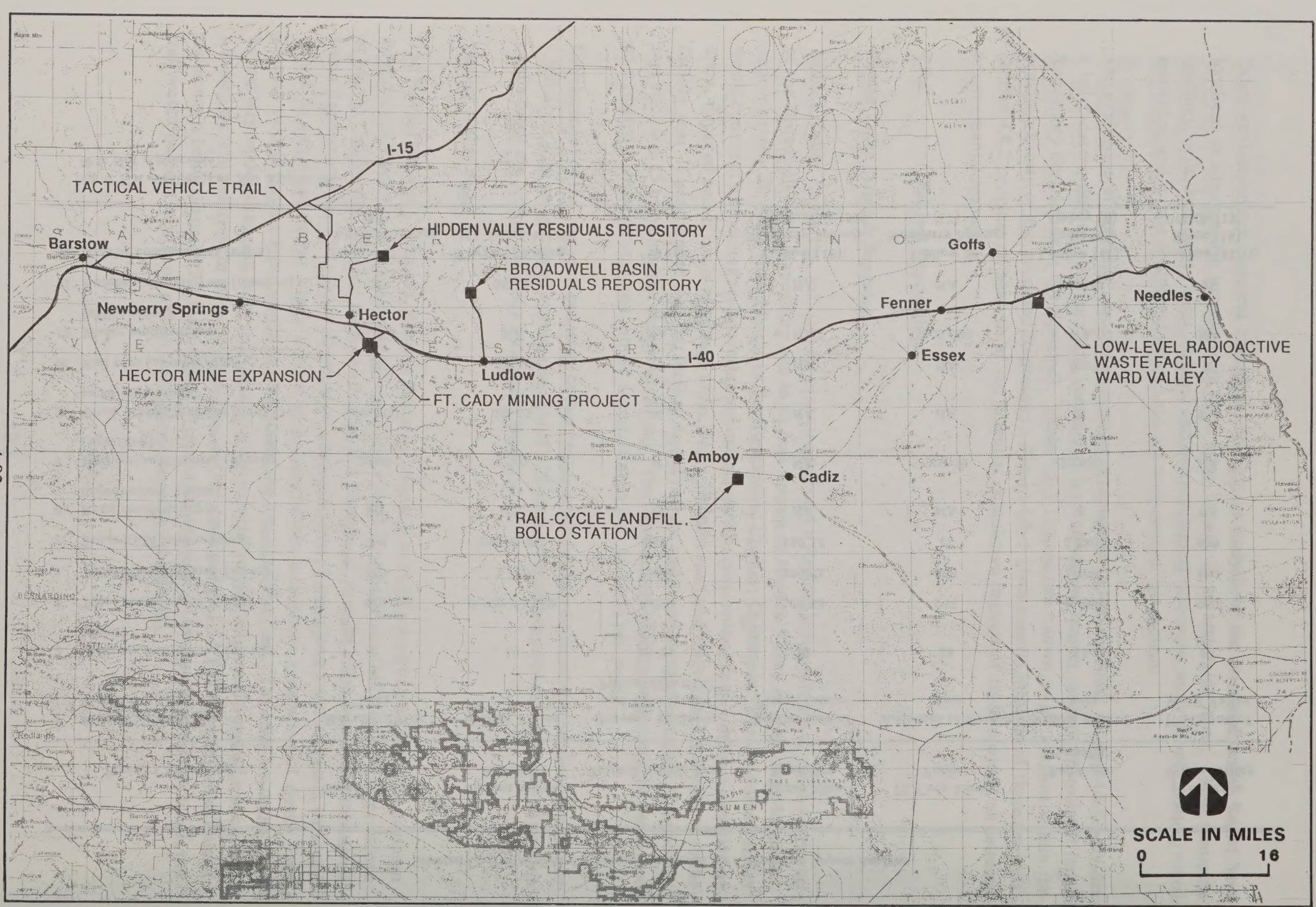


Figure 4.8-1 Projects Considered for Cumulative Impact Analysis

Hector Mine Expansion

N.L. Industries has been mining hectorite in an area approximately 18 miles from Ludlow (26 miles southwest of the Broadwell Basin Repository site) for over 50 years. The company intends to expand the total acreage of their existing stockpiles (currently on patented land) onto 139 acres of BLM-managed land. The proposed action would be completed in four phases as follows:

Phase	Area Required	Duration
I	54.74 acres	1990 to 1999
II	58.42 acres	2000 to 2007
III	34.44 acres	2007 to 2027
(on patented lands)		
IV	26.17 acres	2027 to 2031

The site is located within BLM Category 3 desert tortoise habitat.

Fort Cady Mining Project

Fort Cady Minerals Corporation proposes to construct and operate an in-situ solution mine and processing plant to produce 90,000 tons of boric acid per year. The project site is located approximately 18 miles west of Ludlow (26 miles from the Broadwell Basin Repository site) and two and one-half miles south of Interstate 40. It is located adjacent to the Hector Mine. The facility would comprise a total of 250 solution wells, 280 acres of solar evaporation ponds, a six-acre processing facility and a 60-acre gypsum deposition area. Process water would be recovered from an aquifer located to the west of the Pisgah Fault. The project design has been based on the cumulative knowledge gained from two phases of field pilot programs and a successful pilot-commercial plant operation on the site. Full-scale mining operations would, to a large extent, be a scaling up of the pilot-commercial plant. A railway spur into the plant area would be constructed and all access and service roads would be graded.

Rail-Cycle Waste Management Facilities

The Rail-Cycle joint venture would site, design, construct, and operate a Class 3 landfill on railroad property near Bolo Road between Amboy and Cadiz. The site is located about 45 miles east of Ludlow (53 miles from Broadwell Basin Repository site) near U.S. Route 66. Seven sections of land (4,480 acres) would be dedicated to the project. However, only 1,900 acres are to be used for actual landfilling; the balance is reserved for buffer zones, and a desert preserve and information center.

Capacity of the project is estimated to be at least 685 million cubic yards. With an assumed compaction to 1,200 pounds per cubic yard, the site would have a service life of about 66 to 100 years, depending on the rate of loading. The facility would initially receive a nominal 3,000 tons per day from one unit train on a six-day basis for a total of 936,000 tons per year. In five years, seven trains would haul 21,000 tons per day. At year six and beyond, the fill rate would be constant at 21,000 tons per day, which equates to nearly seven million tons per year.

Fifty persons would be required to operate the landfill at maximum capacity. Potable water would be brought to the site in railroad tank cars.

The landfill would be constructed by excavating, lining, and then filling 20-acre modules excavated to an average depth of 35 to 125 feet. Excavated soils would be stockpiled and used for cover purposes. The final landfill surface would rise about 420 feet above the native terrain at the center of the site.

Low-Level Radioactive Waste Facility

U.S. Ecology, Inc., as a license designee of the State of California, proposes to build a low-level radioactive waste (LLRW) disposal facility near the northern end of the Ward Valley in San Bernardino County, California. The site is approximately 85 miles east of the Broadwell Basin Repository site. The site is on federal land managed by the BLM, and is about one and one-half square miles in total area, including a buffer zone. The land would need to be conveyed from BLM to the State of California through the State Indemnity Selection process. The project would include the following basic components:

- A 70-acre fenced disposal area
- A 7.6-acre fenced support area
- A flood protection berm around the disposal area

The project would provide for the permanent disposal of LLRW, which is a state responsibility under Public Law 99-240. The wastes would be disposed of in containers in trenches and then covered with soil. It is expected that the project would receive LLRW for a period of 30 years until closure. After closure, the state would maintain the site for a period of 100 years.

4.8.2 Resource-Specific Impacts

4.8.2.1 Biological Resources

Biological resources (plant and wildlife) would experience cumulative impacts as a result of the disturbance of lands required for the construction and operations of all projects identified for cumulative impact analysis. Detailed inventories of plants and wildlife would be provided by individual project proponents as part of the National Environmental Policy Act process and are not discussed in this section. Cumulative impacts on one biological resource (desert tortoise), which is of particular concern, are discussed here.

Except for the LLRW facility, all projects identified for cumulative impact analysis are located in Category III habitats and, without appropriate mitigations, may have significant impacts on desert tortoise. The LLRW facility is located in Category I habitat and would result in the loss of 90 acres of high-quality tortoise habitat. A number of mitigation measures to protect the tortoise and to compensate for their loss have been adopted by the BLM and the project proponents to minimize the impacts.

4.8.2.2 Air Quality

All projects identified for the cumulative impact analysis are located in the SEDAB under the jurisdiction of the San Bernardino County APCD, which has permitting authority for the SEDAB portion of San Bernardino County. The SEDAB region currently meets the federal and state standards for all criteria pollutants except ozone and PM_{10}. The key rule applicable to all projects, except the tactical vehicle trail, is the District's New Source Review (NSR) rule. NSR requirements are applicable to nonattainment pollutants and their precursors. Because ozone and PM_{10} are considered nonattainment, these pollutants and their precursors are regulated by the APCD under the NSR rule.

All projects would contribute to the increase in concentrations of ozone and PM_{10} (criteria pollutants not in compliance) in the SEDAB region. These increases would occur both from the operations on project sites and from the increased vehicular traffic associated with the projects.

In order to obtain air quality permits, the project proponents would have to demonstrate that the pollutant emissions will be minimized through the use of BACT and/or procurement of emission offsets from existing sources. Cumulatively, the air quality impacts of all identified projects would be considerably larger than those from the proposed action. However, these significant impacts would be unavoidable and would be minimized by meeting the regulatory requirements.

4.8.2.3 Transportation/Circulation

Traffic on Interstate 40 between Barstow and Needles would increase as a result of the implementation of projects identified for cumulative impact analysis. Anticipated increase in truck traffic from the Broadwell Basin Repository is estimated at 80 to 200 trucks per day depending upon the capacity of the trucks (10 or 25 tons per truck). The Hidden Valley Repository project could add 10 to 15 trucks and the LLRW facility two to three trucks per day, increasing the total truck traffic to a range of 92 to 218 trucks per day. The operations on the tactical vehicle trail would add an unspecified number of military vehicles occasionally to the traffic stream in the area. This would, however, not affect existing traffic routes, particularly Interstate 40. Cumulative impacts on Interstate 40 are, therefore, not expected to be substantially different from those identified for the proposed action. This is partly due to the fact that about 85 percent of the waste brought to the Hidden Valley Repository site and 100 percent of the waste brought to the Rail-Cycle landfill site would be transported by rail. Similarly, almost the entire production of minerals from Hector mines and Fort Cady mining project would be transported by railroads. The number of rail cars added to the present railroad traffic in the Interstate 40 corridor (870 to 890 rail cars) is not expected to result in any significant adverse impacts on rail traffic.

4.8.2.4 Land Use

The seven projects identified for cumulative impact analysis could occupy between 12,000 to 20,000 acres of the 12.1 million acres of BLM land in the CDCA. Of this land, approximately 6,200 acres are estimated to be physically disturbed by construction activities and operations at the project sites. Not all lands are directly controlled by the BLM, although as much as 4,000 to 12,000 acres of all project-related lands are under BLM jurisdiction.

All projects identified for cumulative analysis except the Hidden Valley Residuals Repository lie within the multiple-use Class M category, where activities of the type proposed are allowed if environmental impacts can be minimized to the extent possible. Hidden Valley Residuals Repository lies in multiple-use Class L.

Only portions of the residuals Repository at Hidden Valley and the proposed realignment of Crucero Road for the Broadwell Basin Repository are likely to affect the federal lands within WSAs which have been recommended as unsuitable for wilderness designation by the BLM. No project lies within the recommended wilderness areas designated as Class C. However, until a congressional determination is made, these lands must be managed under the BLM's IMP and the cumulative impacts would be considered significant.

5.0 OTHER REQUIRED CONSIDERATIONS

5.0 OTHER REQUIRED CONSIDERATIONS

5.1 RELATIONSHIP BETWEEN SHORT-TERM USES OF THE ENVIRONMENT AND THE MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

Principal uses of the project area, as established by the County General Plan, California Desert Conservation Area Plan, and the Bureau of Land Management, include dispersed recreation, and mineral exploration and production. The proposed action would commit approximately 316 acres of this land to a single land use (Specified Hazardous Waste Facility) for the 20- to 50-year life of the project. Even after this period, this land would not be available for mining or most other uses though some dispersed recreation might be allowed in the reclaimed areas. In addition, another 590 acres would be used for coarse materials and clay borrow areas for the life of the project. These areas would be available for other designated uses after reclamation of land is accomplished, in accordance with the reclamation plan (Appendix F), at the end of the project life. In the short term, about 60 to 70 acres of land would be disturbed for the construction and upgrade of Crucero Road. However, improvement of this road would enhance the accessibility of wilderness areas to recreationists, mineral explorers, and other public users of the land. There would be some long-term public health risk from possible toxic emissions, but these risks would be within acceptable limits.

Project employment, direct and indirect expenditures, and property taxes would contribute to the economic health of the broader Southern California region. Development of proper hazardous waste repositories is in the national and regional interests of Southern Californians. In providing these benefits, the project would enhance the long-term productivity and economic well-being of Southern California.

In view of the demonstrated need for facilities to dispose of treated hazardous waste in Southern California, Broadwell Corporation believes that the construction of the proposed project is justified now.

5.2 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

The land requirements for the Repository represent an irreversible commitment because the aboveground Repository, except for ancillary facilities, could not be removed at the end of the project and the land restored to its original condition. The mound created by the Repository is expected to stay in perpetuity and the land underneath would not be available for other potential uses such as mining of clay or other mineral resources. However, the biological habitat lost during construction and operation of the Repository could be restored to a large extent.

The irretrievable commitment of resources during construction and operations of the Repository would involve the use of energy and materials. Energy would be expanded in the form of diesel fuel, gasoline, and oil for construction equipment and transportation vehicles, and electricity for plant gasoline, and oil for construction equipment and transportation vehicles, and electricity for plant operations. This consumption would occur whether the waste is brought to the proposed Broadwell Repository or shipped to other existing or planned facilities in or outside the state. The major commitment of materials would include clay (5.5 million tons) and coarse aggregate (10.4 million tons) for construction and operation of the Repository, and water (30,000 to 70,000 gallons/day), for dust control, equipment decontamination, and domestic use over the 20- to 50-year life of the project.

The proposed project would irreversibly change the visual character of the site because the Repository site, as well as the clay and coarse material borrow areas, cannot be reverted to their original condition. Mitigation measures would reduce long-term visual contrasts of the area, but nearby viewers would notice contrasts in color and landform relative to the surrounding environment.

5.3 GROWTH-INDUCING EFFECTS OF THE PROPOSED ACTION

Growth-inducing effects are those characteristics of a project that tend to foster or influence direct and indirect growth in its environs, or that create significant new demands for supporting services and activities.

The growth-inducing effects of the proposed action would be limited to the housing demand for employees, if they were to move to Ludlow, California. The project would provide employment to about 100 construction workers for a period of one year and 35 to 45 operations employees for the life of the Repository operations (20 years). Construction workers are not likely to seek permanent residence in Ludlow or the project vicinity. They would travel to the job site from Barstow, San Bernardino, or other Southern California communities. Facilities in Ludlow are not adequate, even for the 35 to 45 operations workers. These employees are expected to seek housing in Barstow or Newberry Springs, where adequate housing and other infrastructure are available.

No unusual construction equipment, materials, or supplies would be required for the project. These should be procurable from existing manufacturers, vendors, and other suppliers.

Based on these considerations, neither the construction nor the operation of the proposed project would be expected to induce significant growth.

6.0 ORGANIZATIONS AND PERSONS CONSULTED

6.0 ORGANIZATIONS AND PERSONS CONSULTED

A number of technical reports were prepared by independent consultants under the direction of Tom Dodson and Associates as part of the Application for Site Approval and Facilities Plan for the Broadwell Basin Residuals Repository submitted to the County of San Bernardino. Tetra Tech and the lead agencies have evaluated these reports for their technical contents and utilized them as the primary source in the preparation of the EIR/EIS. These sources of information are listed in Table 6-1.

The federal, state and regional agencies and individuals that were contacted as part of the initial scoping process and who provided comments are listed in Table 6-2.

Table 6-1

Major Sources of Information for EIR/EIS Preparation

Author	Report	Date
BSI Consultants, Inc.	Traffic Impact Study for the Proposed Broadwell Dry Lake Hazardous Waste Repository in San Bernardino County, California	April 1990, Revised, September 1990
Broadwell Corporation	Final Application Package to San Bernardino County for the Broadwell Basin Residuals Repository	August 1989
	Application to Purchase Mineral Material to the U.S. Department of the Interior, Bureau of Land Management	September 1990
Brown-Buntin Associates	Acoustical Analysis, Broadwell Basin Waste Repository Site EIR, San Bernardino County, California	June 1990
Brown and Caldwell Consultants	Hydrological Investigation, Proposed Residuals Repository, Broadwell Dry Lake, San Bernardino, California	June 1990
	Hydrology and Project Element Assessment, Proposed Residuals Repository, Broadwell Dry Lake, San Bernardino County, California	August 1990
	Health Risk Assessment, Proposed Residuals Repository, Broadwell Dry Lake, San Bernardino County, California	October 1990
Tom Dodson and Associates	Broadwell Basin Residuals Repository, Land Use and Planning Issues	September 1990
EMCON Associates	Need Assessment for the Broadwell Basin Residuals Repository	May 1990
	Construction and Operations Description, Broadwell Basin Residuals Repository, San Bernardino County, California	May 1990
	Broadwell Basin Residuals Repository EIR/EIS, Responses to Questions from Tetra Tech, Memo from Ken Albin to Raj Mathur	August 1990
	Desiccation Features Investigation, Broadwell Basin Residuals Repository	December 1990
Geographics	Visual Resource Assessment for a Residuals Repository Proposed by the Broadwell Corporation	April 1990 Revised, August 1990

Table 6-1, Continued

Author	Report	Date
Hatheway and McKenna	A Phase I Cultural Resources Investigation for the Proposed Broadwell Repository, North of Ludlow, California	January 1990
Jeanette A. McKenna	Supplemental Investigations, The Broadwell Repository Project Area, Testing Locations and Access Routes	June 1990
	Supplemental Report, Phase I Cultural Resources Investigation for the Proposed Broadwell Repository, North of Ludlow, San Bernardino County, California, Borrow Areas C-1 and G-1	August 1990
	Addendum Report, Phase I Archaeological Survey of the Broadwell Repository Alternative Access Road	December 1990
	Determination of Eligibility Report for Historic Resources Associated with the Broadwell Repository Project Area, San Bernardino County, California	April 1991
Denise LaBerteaux	Desert Tortoise Clearance Survey, Broadwell Basin Residuals Repository Site	December 1990
Rasmussen & Associates, Inc.	Geologic and Geotechnical Feasibility Investigation, Proposed Residuals Repository, Broadwell Dry Lake North of Ludlow, California	March 1990
Sierra Research, Inc.	Air Quality Impacts of Proposed Broadwell Lake Project	August 1990 Revised December 1990
Tierra Madre Consultants, Inc. (TMC)	Broadwell Dry Lake Hazardous Waste Repository, Focused Desert Tortoise Survey	April 1990
	Broadwell Dry Lake Biological Assessment	November 1989 Revised, June 1990
	Broadwell Dry Lake Borrow Site Biological Assessment	August 1990
	Focused Desert Tortoise Survey for the Two Alternate Access Roads West of Crucero Road	September 1990
	A Reinspection of Potential Desert Tortoise Burrows Found During the LaBerteaux Study, A Letter Report	March 1991

Table 6-2

Organizations and Individuals Who Provided Comments on Notice of Preparation, Notice of Intent, or Notice of Proposed Action

Bayne, L. Thomas, Bakersfield, CA
California Air Resources Board, Sacramento, CA
California Department of Fish and Game, Long Beach, CA
California Department of Transportation, San Bernardino, CA
California Regional Water Quality Control Board, Lahontan Region, Victorville, CA
Engle, Evelyn, Newberry Springs, CA
Greenpeace, San Francisco, CA (Margie Kelly)
Goddard & Goddard Engineering, Lucerne, CA (Wilson Goddard)
Hickman, Sue, Yermo, CA
Mitchell, (Dr.) Diane L., Bakersfield, CA
Moyle, W.R., Jr., Cypress, CA
National Federation of Federal Employees, Local No. 759, Oakland, CA (Joaquin Villa)
Natural Resources Defense Council, San Francisco, CA (Johanna H. Wald)
Orrick, Herrington & Sutcliffe, Los Angeles, CA (W. Douglas Kari)
U.S. Bureau of Land Management, Barstow, CA (Alden Sievers)
U.S. Fish and Wildlife Service, Laguna Niguel, CA (Brooks Harper)
U.S. Army Corps of Engineers, Los Angeles, CA (Kitty Connelly)
The Wilderness Society, San Francisco, CA

7.0 LIST OF PREPARERS

7.0 LIST OF PREPARERS

This Environmental Impact Report/Environmental Impact Statement (EIR/EIS) has been prepared by Tetra Tech, Inc., under the direction of the County of San Bernardino Planning Department and the Bureau of Land Management. Tom Dodson and Associates and EMCON Associates (Technical Consultants to Broadwell Corporation) provided information for preparing this document. The County of San Bernardino and the Bureau of Land Management independently evaluated the information contained herein.

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9.0 GLOSSARY

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Terms

Aeolian. Soil material that accumulates through wind action.

Air Quality Control Region. An area designated by the federal government pursuant to paragraph 107 of the Clean Air Act in which communities share a common air pollution problem, sometimes involving several states.

Alluvium. Material such as clay, silt, sand, or gravel deposited by streams.

Alluvial Fan. A sedimentary structure consisting of a fan-shaped deposit of mixed grain sizes including silt, sand, gravel, and in many cases, coarser material; found at the bases of mountains in arid regions.

Ambient Air. That portion of the atmosphere outside of buildings to which the general public has access.

Ambient Air Quality Standards. Standards established on a state or federal level that define the limits for airborne concentrations of designated "criteria" pollutants (nitrogen dioxide, sulfur dioxide, carbon monoxide, particular matter [PM_{10}], ozone and lead) to protect public health with an adequate margin of safety (primary standards) and to protect public welfare, including plant and animal life, visibility, and materials (secondary standards).

Ambient Noise. The sound pressure levels associated with a given environment. It is usually a composite of sounds from near and far sources, none of which are particularly dominant.

Andesite. An igneous rock of composition intermediate between granite and basalt; usually volcanic, less commonly a shallow intrusive.

Animal Unit Month (AUM). The amount of forage required to sustain the equivalent of one cow or five sheep for 1 month.

Aquifer. The water-bearing portion of subsurface earth material that yields or is capable of yielding useful quantities of water to wells.

Attainment Area. An area that has been designated by the Environmental Protection Agency and the appropriate state air quality agency as having ambient pollutant concentrations below the ceiling concentrations defined by under the National Ambient Air Quality Standards.

Bajada. A long outwash slope at the base of a mountain range.

Basalt. A common, heavy, black volcanic rock, usually formed as a lava flow cools.

Basin. A round to elongate depression that can be either a topographic depression on the earth's surface or a depression in the crust that may be filled with sediment.

Carrying Capacity. Then number of organisms of a given species and quality that can survive in (and not cause deterioration of), an ecosystem through the least favorable environmental conditions that occur within a stated interval of time.

Clay. A common, very fine-grained material composed of a number of minerals having similar sheet-like structures and very low hydraulic conductivity across the sheets, usually in the vertical direction.

Clear Zone. Defined in Federal Aviation Regulations, Part 152.9(b): an area at ground level; extending beyond the runway primary surface and underlying the approach surface; these zones, which include all of the area out to a point where the approach surface reaches 50 feet above ground level, are presented in detail on the Airport Layout Plan for each airport. The federal government requires that the airport owner have an "adequate property interest" in the clear-zone area in order that the requirements of FAR Part 77 can be met and the area protected from future encroachments. Adequate property interest may be in the form of ownership in fee simple (the most preferred) or lease (provided it is long term) or any other demonstration of legal ability to prevent future obstructions in the runway clear zone.

Coefficient of Permeability. Or coefficient of hydraulic conductivity, or a measure of the resistance a soil has for the movement of liquids through it. This value is independent of void ratio or density and dependent on pore size and hydraulic gradient.

Corridor. A strip of land of various widths on both sides of a particular linear facility such as a highway or utility line.

Cretaceous. A period of geologic time from approximately 136 to 65 million years ago; also the rocks formed during that period.

Dacite. A fine-grained igneous rock formed by volcanic action or by shallow intrusion into other rocks.

Desiccation Crack. A crack formed as the result of stresses set up as material dries out; used in this document for fissures formed as drying of playa sediments proceeds and sets up stresses which reach the yield point.

Diversity. The distribution and abundance of different plant and animal communities and species within an area.

Ecosystem. A system formed by the interaction of a community of organisms with their environment.

Endangered Species. An animal or plant species that is in danger of extinction throughout all or a significant portion of its range (as defined in the Endangered Species Act Amendments of 1982).

Ephemeral Stream. A stream that flows only during and shortly after periods of significant precipitation. Such flow is usually of short duration. Also called a blueline stream.

Epicenter. The point on the earth's surface directly above the focus of an earthquake.

Evaporite. A sedimentary rock composed of minerals produced from a saline solution that becomes concentrated by evaporation of the solvent; salt and gypsum are typical in the California desert.

Fault. A break in the rocks of the earth's crust along which movement has occurred.

Federal Aviation Administration (FAA). A federal agency charged with regulating air commerce to promote its safety and development, encouraging and developing civil aviation, air traffic control, and air navigation and promoting the development of a national system of airports.

Fugitive Dust. Particulate matter composed of soil that is uncontaminated by pollutants from industrial activity. Fugitive dust may include emersions from haul roods, winds erosion of exposed soil surface, and other activities in which soil is either removed or redistributed.

Fugitive Emissions. Emissions released directly into the atmosphere that could not reasonably pass through a stack, chimney, vent, or other functionally equivalent opening.

General Plan. A plan required of counties and cities pursuant to Section 65300 et.seq. of the California Government Code (Title 7: The Planning, Zoning, and Development Laws) which defines long-term planning objectives and policies and serves as a guide for local decision-makers. Required elements of the plan include: Land Use, Transportation, Housing, Conservation, Open Space, Seismic Safety, Noise, Scenic Highways, and Safety. Optional elements, such as a Hazardous Waste element, may also be added to the plan.

Granite. A common, coarse-grained intrusive igneous rock, composed mostly of quartz and feldspar, some mica, and minor dark minerals.

Groundwater. Water in the ground that fills openings (pores) between sediment particles and in consolidated rocks.

Groundwater Table. The surface in the ground below which all pore spaces are filled with water and at which the hydraulic pressure equals the atmospheric pressure.

Habitat. The place where an animal or plant normally lives, often characterized by a dominant plant and codominant form, such as creosote bush scrub habitat.

Hazardous Waste Management Plan. The Hazardous Waste Management Plan is the county's primary planning document for hazardous waste management. Among other items, it must include policies for the siting of facilities. This plan will be integrated in the county's General Plan upon its adoption.

Hydraulic Conductivity. A coefficient describing the rate at which water can move through a medium, expressed in gallons per day per square foot; similar to permeability.

Hydraulic Gradient. The slope of the groundwater table (as used in this document), expressed in units of elevation decrease per unit of distance between points where elevations are measured.

Impair Wilderness Suitability. Refers to activities that are considered to impair an area's suitability for preservation as wilderness -- i.e., that do not satisfy the "nonimportant criteria" set forth in the Interim Management Policy and Guidelines for Lands Under Wilderness Review.

Infiltration. Movement of water downward from the surface toward the groundwater table.

Interstate. The designated National System of Interstate and Defense Highways in both rural and urban areas; they connect the East and West coasts and extend from Canadian border points to various points on the Mexican border.

Jurassic. A period of geologic time immediately preceding the Cretaceous Period, 190 to 136 million years ago.

Lacustrine. (Adjective) having to do with lakes.

Level of Service. In transportation analyses, a qualitative measure describing operational conditions within a traffic stream and how they are perceived by motorists and/or passengers.

Massive. As it pertains to soils, this represents a structureless soil that has soil particles in a very compact organization.

Mesic. Pertaining to a habitat characterized by a moderate amount of water.

Microgram. One-millionth of a gram.

Miocene. An epoch of geologic time and a subdivision of the Tertiary Period; 25 to 5 million years ago.

Multiple Use. "... the management of the public lands and their various resource values so that they are utilized in the combination that will best meet the present and future needs of the American people; making the most judicious use of the land for some or all of these resources or related services over areas large enough to provide sufficient latitude for periodic adjustments in use to conform to changing needs and conditions; the use of some land for less than all of the resources; a combination of balanced and diverse resource uses that takes into account the long-term needs of future generations for renewable and nonrenewable resources, including, but not limited to, recreation, range, timber, minerals, watershed, wildlife and fish, and natural scenic, scientific and historical values; and harmonious and coordinated management of the various resources without permanent impairment of the productivity of the land and the quality of the environment with consideration being given to the relative values of the resources and not necessarily to the combination of uses that will give the greatest economic return or the greatest unit output." (From Section 103, Federal Land Policy Management Act, 43 U.S.C. Paragraph 1702 (c).)

Nocturnal. Pertaining to nighttime activity of wildlife species.

Perennial Stream. A stream that flows continually or nearly so, including through dry periods.

Permeability. A measure of the ability of a rock unit to allow water to pass through it.

Playa. A lake bed that is dry most of the time, has an unusually flat surface, and lies generally surrounded by alluvial fans adjacent to mountain ranges in arid regions.

Preliminary Wilderness Recommendation. Refers to a wilderness recommendation at any stage prior to the time when the Secretary of the Interior reports his recommendation to the President. Until the Secretary acts, the recommendation is "preliminary" because it is subject to change during the administrative review.

Prime Agriculture Lands. Land that is in one of the following categories:

1. Rated as Class I or Class II in the Soil Conservation Service land use capability classifications.

2. Rated 80 through 100 in the Storie Index Rating.

3. Supports livestock used for the production of food and fiber and which has an annual carrying capacity equivalent to at least one animal unit per acre as defined by the U.S. Department of Agriculture.

4. Planted with fruit or nut-bearing trees, vines, brush, or crops which have a non-bearing period of less than 5 years and which will normally return during the commercial-bearing period on an annual basis from the production of unprocessed agricultural plant production not less than $200 per acre.

5. Returned from the production of unprocessed agricultural plan products an annual gross value of not less than $200 per acre for 3 of the previous 5 years.

Profile. A vertical section of the soil through all its horizons.

Public Lands. Any lands and interest in lands owned by the United States administered by the Secretary of the Interior through the Bureau of Land Management, without regard to how the United States acquired ownership, except:

1. Lands where the United States owns the minerals but the surface is not federally owned.

2. Lands being held for the benefit of Indians.

Public Roadway. A roadway with public interest, but which may not necessarily be maintained by a public agency.

Quaternary. The most recent, including the present, period of geologic time; includes the Pleistocene ("Ice Age") and Holocene (past 11,000 years) epochs.

Raptor. Birds of prey, e.g., eagle, hawk, and owl.

Residuals Repository. A residuals repository is a landfill developed to dispose of the end products or residuals remaining after treatment of hazardous waste.

Riparian Area. Land along the bank of a stream or other body of water and directly influenced by the presence of water, seasonal or intermittent, e.g., streamsides, lake shores, etc.

Roadless. For the purpose of the wilderness review program, this refers to the absence of roads which have been improved and maintained by mechanical means to ensure relatively regular and continuous use. A way maintained solely by the passage of vehicles does not constitute a road.

Words and phrases used in the above definition of "roadless" are defined as follows:

1. Improved and maintained: Actions taken physically by man to keep the road open to vehicular traffic. "Improved" does not necessarily mean formal construction. "Maintained" does not necessarily mean annual maintenance.

2. Mechanical means: Use of hand or power machinery or tools.

3. Relatively regular and continuous use: Vehicular use which has occurred and will continue to occur on a relatively regular basis. Examples are: Access roads for equipment to maintain a stock water tank or other established water sources; access roads to maintained recreation sites or facilities; or access roads to mining claims.

Saleable Minerals. Natural deposits found on public land that may be sold by the federal government; commodities such as sand, gravel, cinders, clay, rock, pumice, limestone, etc.

Scent Station. A 1-meter-square area on the ground that is swept and dusted with flour and baited with sardines to attract nocturnal mammalian predators. Also called predator scent station, bait stations, or tracking stations.

Sediment. Loose, unconsolidated material composed of clay, silt, sand, or gravel and derived from the mechanical and chemical breakup of preexisting rocks.

Seismic. Having to do with earthquakes, especially shaking.

Sensitive Land Use. A land use very sensitive to noise. Examples of sensitive land uses include educational facilities, hospitals, convalescent homes, theaters, churches, and residences.

Sensitive Species. Species (plant or animal) with special needs that may be influenced by management programs.

State Implementation Plan. A state plan, required under the Clean Air Act, that must be submitted to the Environmental Protection Agency and that describes how the state will implement, enforce, and maintain the National Ambient Air Quality Standards.

Strike-Slip. The type of movement that is lateral along a fault. If not hyphenated, refers to the amount of movement.

Structure (Geologic). A geologic unit that is defined by the geometric relationships between or within rock masses; a fault is an example and is the one discussed herein.

Suitability. As used in the Wilderness Act and in the Federal Land Policy and Management Act, refers to a recommendation by the Secretary of the Interior or the Secretary of Agriculture that certain federal lands satisfy the definition of wilderness in the Wilderness Act and have been found appropriate for designation as wilderness on the basis of an analysis of the existing and potential uses of the land.

Water Guzzler. Water catchment structure designed to collect and retain rain water as a water source for wildlife.

Wilderness Area. An area formally designated by Congress as part of the National Wilderness Preservation System.

Wilderness Study Area (WSA). A roadless area or island that has been inventoried and found to have wilderness characteristics as described in Section 603 of the Federal Land Policy Management Act and Section 2(c) of the Wilderness Act of 1964 (78 Stat. 891).

Acronyms

ACEC	Area of Critical Environmental Concern
ANSI	American National Standards Institute
AQCR	Air Quality Control Region
BLM	Bureau of Land Management
CARB	California Air Resources Board
CDCA	California Desert Conservation Area
CDFG	California Department of Fish and Game
CEQ	Council on Environmental Quality
CEQA	California Environmental Quality Act
CHP	California Highway Patrol
CNEL	Community Noise Equivalent Level
CO	Carbon Monoxide
DHS	California Department of Health Service
EIR	Environmental Impact Report
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency
FHWA	Federal Highway Administration
FLPMA	Federal Land Policy Management Act
HVAC	Heating, Ventilating, and Cooling System
HVR	Hidden Valley Resources
IMP	Interim Management Policy
LCRS	Leachate Collection and Removal System
LDL	Larson-Davis Laboratories
LOS	Level of Service
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NO_2	Nitrogen Dioxide
NOP	Notice of Preparation
NO_x	Nitrogen Oxide
NO_3	Nitrate
NRHP	National Register of Historic Places
O_3	Ozone
Pb	Lead
PM_{10}	Particulate Matter Greater Than 10 Microns in Diameter

PMP	Probable Maximum Precipitation
SCAB	South Coast Air Basin
SCAG	Southern California Association of Governments
SEDAB	Southeast Desert Air Basin
SHPO	State Historic Preservation Officer
SIP	State Implementation Plan
SO_2	Sulphur Dioxide
USFWS	U.S. Fish and Wildlife Service
V/C	Volume-to-Capacity
VOC	Volatile Organic Compounds
VRM	Visual Resources Management
WSA	Wilderness Study Area

Units of Measurement

cm/sec	centimeters per second
cy	cubic yard
dB	decibel
dBA	decibel on the A-weighted scale
gpd	gallons per day
gpm	gallons per minute
kg	kilograms
L_{dn}	day/night equivalent noise level
L_{eq}	energy equivalent continuous noise level
mg	milligrams
mg/l	milligrams per liter
mg/m^3	milligrams per cubic meter
mph	miles per hour
ppm	parts per million

10.0 INDEX

10.0 INDEX

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APPENDIX A

APPENDIX A - NOTICE OF PREPARATION, INITIAL STUDY, AND RESPONSES TO NOTICE OF PREPARATION

LAND MANAGEMENT DEPARTMENT

5 North Arrowhead Avenue • San Bernardino, CA 92415-0180 • (714) 387-4091

COUNTY OF SAN BERNARDINO
ENVIRONMENTAL
PUBLIC WORKS AGENCY

JOHN N. JAQUESS
Land Management Director

OFFICE OF PLANNING
Sharon W. Hightower
County Planning Officer

OFFICE OF SURVEYOR
Claude D. Tomlinson, L.S.
County Surveyor

OFFICE OF BUILDING AND SAFETY
Larry L. Schoelkopf, P.E.
County Building Official

Date: October 17, 1989

To: Responsible and Trustee Agencies
Interested Citizens and Groups

Subject: **NOTICE OF PREPARATION OF ENVIRONMENTAL IMPACT REPORT AND PUBLIC SCOPING MEETING FOR THE BROADWELL CORP. HAZARDOUS WASTE REPOSITORY, 10 MI. NORTH OF LUDLOW**

The San Bernardino County Office of Planning will be coordinating the preparation of an Environmental Impact Report (EIR) for the **Broadwell Corporation Hazardous Waste Repository**, ten miles north of Ludlow.

The project is a General Plan Amendment and Conditional Use Permit to site a hazardous waste repository on Broadwell Dry Lake. State law requires the Office of Permit Assistance to convene a "post-application" meeting of affected agencies and the public. This meeting will also be used for public scoping of the EIR for the project. This meeting is scheduled as follows:

Wednesday, November 1, 1989 at 6:30 p.m.
Newberry Springs Community Building
30884 Newberry Road, Newberry Springs

The Environmental Initial Study, completed October 17, 1989, identified the following areas of potentially significant impact: 1) Geologic Hazards, 2) Flood Hazards, 3) Wind/Erosion, 4) Noise, 5) Hazardous Materials, 6) Biological Resources, 7) Cultural and Paleontological Resources, 8) Air Quality, 9) Water Supply and Quality, 10) Scenic and Visual Resources, 11) Soil Engineering, 12) Mineral Resources, 13) Infrastructure, 14) Transportation and Circulation, and 15) Land Use.

Copies of the Initial Study are available at the Newberry Springs Community Building as well as the following locations:

Office of Planning
385 N. Arrowhead Ave.
San Bernardino CA 92415-0182
Attn: Paul Kielhold
(714) 387-4146

Office of Planning
15505 Civic Drive
Victorville CA 92392
Attn: Mike Williams
(619) 243-8245

This letter is a request for environmental information that you or your organization feels should be addressed in the Environmental Impact Report. Detailed information may be included in your response. Due to time limits, as defined by the California Environmental Quality Act, your response should be sent at the earliest possible date, but no later than 30 days after receipt of this notice. Comments may be made in writing or at the public meeting. Comments and questions can be directed to Paul Kielhold or Mike Williams at the addresses above.

Sincerely,

EPWA/LAND MANAGEMENT
OFFICE OF PLANNING

Paul Kielhold

PAUL KIELHOLD, ENVIRONMENTAL ANALYST
ENVIRONMENTAL ANALYSIS TEAM

Attachment: Initial Study

cc: John Keene, State Clearinghouse (10 copies, with attachment)
Chris Kinne, Office of Permit Assistance (with attachment)
Ray Bransfield, USFWS (with attachment)
Alden Sievers, BLM (with attachment)
Phillip Fernando, SCHWMA (with attachment)
Clarence Gieck, Broadwell Corp. (with attachment)
Robert Levy, Broadwell Corp. (with attachment)
Tom Dodson, Tom Dodson Associates (with attachment)
Distribution (without attachment)

SAN BERNARDINO COUNTY
INITIAL STUDY ENVIRONMENTAL CHECKLIST FORM

This form and the descriptive information in the application package constitute the contents of an Initial Study pursuant to County Guidelines under Ordinance 3040 and CEQA Guidelines §15063.

I. DATES ID :745DSN89005516GPA01/05516CF1
COMMUNITY :BROADWELL LAKE
FILE/INDX :A)GPA/89-0101/DN669-329N
B)CUP/89-0102/DN669-329N
APPLICANT :BROADWELL CORPORATION
PROPOSAL :A)GENERAL PLAN LAND USE DISTRICT
:AMEND TO ADD SPECIFIED HAZARDOUS
:WASTE FAC OVERLAY B)COND USE PERMIT
:TO ESTAB HAZARDOUS WASTE FAC/230 AC
LOCATION :CRUCERO ROAD BOTH SIDES APPROX
:7 1/2 MILES NORTH OF NATIONAL
:TRAILS HWY (I 40)
REP('S) :STIRRAT, BRYAN A.
:

USGS Quad: Broadwell Lake

T,R,Section: Section 25,T9N,R7E

Thomas Bros: pp. 706 & 711 (1989)

Planning Area: North Desert

OLUD: RC

Improvement Level: IL5

PROJECT CHARACTERISTICS: Broadwell Corporation proposes to construct a Specified Hazardous Waste Facility to be called the Broadwell Basin Residuals Repository. The facility will consist of approximately 230 acres of disposal area above ground on Broadwell Dry Lake and support laboratory and maintenance structures on adjacent alluvium. Approximately eight miles of paved road will be constructed from Ludlow to the site. Refer to the attachments for more detail.

ENVIRONMENTAL/EXISTING SITE CONDITIONS: The project site for the facility is located in an undeveloped dry lake basin approximately eight miles north from the nearest residence in Ludlow. The site is located on the northwest edge of the dr lake and the only man-made disturbance of the existing creosote bush scrub habitat is a dirt trail that crosses the property. The Ludlow Fault is located approximately one mile west of the property. No permanent water occurs on the surface of the project site.

	EXISTING LAND USE	OFFICIAL LAND USE DISTRICT	IL
North	Open Space	RC	5
South	Open Space	RC	5
East	Open Space	RC	5
West	Open Space	RC	5

II. Identification of maximum potential environmental effects of the proposed project. The purpose is to identify any potentially significant impacts and discuss mitigation measures for identified impacts. Please substantiate your responses by summarizing your assessment of significant impacts and referencing documents used as research (e.g., Norton Air Force Base AICUZ study re: Noise). Include quantification of changes caused by the project's development at maximum potential buildout from existing status.

Circle or underline specific item of concern for "yes" or "maybe" answers if one item applies and others do not. If an impact that would be significant can be mitigated below a level of significance, indicate by checking "yes" or "maybe" with an ">" to "no" and discuss mitigative measure(s) under substantiation. Substantiation is also necessary for "no" answers.

NATURAL HAZARDS

	Yes	Maybe	No
1. **Geologic Hazards.** Will the proposed project result in significant impacts related to:			
a. Unstable earth conditions or changes in geologic substructures?			x
b. Change in topography or ground surface relief features?			x
c. The destruction, covering or modification of any unique geologic or physical features?			x
d. Exposure of people or property to geologic hazards, such as earthquakes, landslides, mudslides, ground failure, or similar hazards?			x
e. Exposure of people or property to water-related seismic hazards such as seiche?			x

SUBSTANTIATION (indicate whether project is located in the Geologic Hazards Overlay District):

1. a. The repository site is located on a clay lake bed with surface cracks which may create unstable earth conditions. This issue will be evaluated as part of an EIR prepared for the project.

1. b. The topography of the lake bed will be altered by constructing the repository above ground on the 230 acre site. Additional topographic

modifications will occur at the clay and alluvial borrow sites. These topographic alterations will be evaluated as part of an EIR.

1. c. A preliminary geologic study ("Preliminary geology investigation, proposed residuals repository, Section 25, T9N, R7E, west margin of Broadwell Dry Lake, north of Ludlow, CA") by Rasmussen & Associates included a field survey that did not identify unique geologic resources. A review of the California Desert Conservation Area Plan (BLM 1980) and its background reports did not identify any unique geologic resources. Concerns have been expressed over the uniqueness of playas (dry lake beds) in the Mojave Desert, and this issue will be addressed in the EIR.

1. d. The repository is identified as a critical land use in the County General Plan and concerns over local faults and regional seismic hazards at the project site will be addressed in an EIR. The Ludlow Fault and other unnamed faults in the area will be evaluated along with concerns over the surface cracks which occur on the lake bed.

1. e. If a regionally significant earthquake occurred with the 100-year flood runoff on the lake, the potential for seiche damage to the repository will exist. This issue will be addressed in an EIR to determine whether the constructed facility would be exposed to significant seiche hazards during such an event.

	Yes	Maybe	No
2. Flood Hazards. Will the proposed project result in significant impacts related to:			
a. Changes in currents, or the course of direction of water movements?		x	
b. Changes in deposition, erosion, or siltation that may modify the channel of a river, stream, bay, inlet, or lake?		x	
c. Alterations to the course or flow of flood waters?		x	
d. Change in the amount of surface water in any water body?		x	
e. Changes in absorption rates, drainage patterns, or the rate and amount of surface runoff?		x	
f. Exposure of people or property to water-related hazards such as flooding or dam inundation?		x	

SUBSTANTIATION (indicate whether project is located in the Flood Plain Safety Overlay District and/or Dam Inundation Overlay):

2. a. The design of the repository project on the lake bed will alter the direction of water movement on the adjacent alluvium and on the lake bed. Surface hydrology impacts caused by the project will be evaluated for significance in an EIR.

2. b. Surface flows on the alluvium will be rerouted and deposition on the lake could be altered. The hydrology evaluation in the EIR will determine whether this could be a significant adverse impact.

2. c. As noted above, the project will alter storm runoff on the alluvium and will displace ponded water on the lake bed when flows from the surrounding drainage are sufficient to create standing water on Broadwell dry lake bed. Flood hazards and drainage evaluations will be provided as part of an EIR to address the potential for significant impacts.

2. d. The proposed repository is not expected to alter the amount of water on the Broadwell dry lake bed after a heavy storm, but it will alter the distribution of water on the lake bed. The potential consequence of this loss of storage area on the lake bed will be evaluated in the EIR to determine its significance.

2. e. Please refer to the hydrology comments above. Construction of the repository on the lake bed clay minimizes the change in absorption (permeability) rates because the natural clays that have permeability rates which exceed 10-7 centimeters/second (Rasmussen 1989) will be used to construct the facility. The proposed disposal site and support structures, maintenance facilities, and road cover less than 300 acres in the approximately 156,000 acre basin (BAS 1988). This represents about 0.2 percent of the whole basin and this degree of change does not represent a significant change in absorption within the basin. As noted above, the alterations in direction and volume of runoff will be evaluated in an EIR.

2. f. Under a 100-year flood scenario, the repository berms will be exposed to flood hazards and seismic seiche. These issues are being addressed in an EIR to determine their potential for significant impact.

	Yes	Maybe	No
3. **Fire Hazards.** Will the proposed project result in significant impacts related to:			
a. Exposure of people or property to wildland fires?			x

	Yes	Maybe	No
b. Man-made fire hazard?		x---->	x

SUBSTANTIATION (indicate whether project is located in the Fire Safety Overlay District):

3. a. A review of the General Plan Fire Safety Overlay shows that the site is not within an overlay zone. The repository site is located on the Broadwell lake bed which has no fuel and no potential fire hazard. The alluvial fan portion of the site has a sparse creosote bush scrub cover that poses little or no fire hazard due to the small amount of fuel. The potential for fire hazard (other than structural) are considered nonsignificant and no mitigation is proposed. This topic will not be addressed in an EIR.

3. b. Due to the distance to the nearest fire station (approximately 30 miles), the applicant will install an adequate water storage and distribution system to meet fire flow requirements. Buildings will be constructed of materials that will retard the spread of fires and other measures outlined in Section 20 (Public Services) of this Initial Study will be implemented to reduce the man-made fire hazards associated with construction of structures in this isolated location.

	Yes	Maybe	No
4. **Wind/Erosion.** Will the proposed project result in significant impacts related to:			
a. Any increase in wind or water erosion of soils, either on or off the site?		x	

SUBSTANTIATION:

4. a. The project site contains slopes ranging from 0-5% which poses minimal erosion hazards. However, the design of the repository places all slopes and operations above ground and the exposure of loose materials to winds at the site will increase the potential for wind and water erosion. This increase in potential erosion could be significant; therefore, the issue will be evaluated in an EIR.

MANMADE HAZARDS

	Yes	Maybe	No
5. **Noise.** Will the proposed project result in significant impacts related to:			
a. Increases in existing noise levels?		x	

Yes Maybe No

b. Exposure of people to severe noise levels? x-----> x

SUBSTANTIATION (indicate whether the project is located in the Noise Hazard Overlay District or is subject to severe noise levels according to the General Plan Noise Element):

5. a. The project site is not located in any Noise Hazard Overlay District nor is it currently subject to severe noise levels according to the Noise Element of the General Plan. The project will result in an increase in noise levels in the vicinity of the site, initially due to construction of the repository facilities and permanently due to facility operations. Common background noise levels in the desert with no noise sources range from 20 dBA (Ldn) and up depending on the background wind conditions. Facility construction and operation will increase onsite noise levels (from daytime operations only) to 60-70 dBA Ldn due to noise generated by large earthmoving equipment and delivery trucks.

The nearest sensitive noise receptor is located approximately eight miles distance from the repository site. These noise receptors are located within 1/4 mile of Interstate 40 and are subject to the background noise levels generated from an average daily traffic of about 10,000 vehicles per day (Caltrans 1988). Based on the San Bernardino County Noise Element Background Report methodology (SBCO 1988, Appendix F), this level of traffic with 57% trucks (Caltrans 1988) would result in a background noise level in excess of 50 dBA Ldn at the furthest residence north of I-40. Noise from the project site during construction and operation would be undetectable at these sensitive receptor sites. The addition of 260 vehicle trips per day along Crucero Road during operations (100 trucks per day and 30 employees) is considered a nonsignificant impact based on the criteria contained on page 1 of Appendix F of the County's Noise Element Background Report.

The project site is located in an area used for low intensity recreation by few individuals. It is not located in a designated wilderness area, a wilderness study area (WSA), or any major desert recreation area (BLM 1980). Based on conversations with local residents and staff of the Barstow Resource Area Bureau of Land Management office, some recreational use does occur in and around the Broadwell Basin. Because the basin does serve as a limited recreation area and lies near several WSA's, the change in the Basin's noise environment may be significant and noise will be evaluated in the EIR.

The overall evaluation indicates that construction and operation of the repository may cause a significant noise impact. Mitigation is proposed to reduce potentially harmful noise levels to employees to nonsignificant levels. The impact of altering the ambient noise levels in the vicinity of the project site will be evaluated.

5. b. Onsite construction and operating noise levels will be high enough to create a noise levels of concern for equipment operators and workers at the repository. Exposure to thise severe noise levels can be controlled through use of appropriate hearing protection devices. Such devices shall be required where noise levels can exceed levels that can damage human ears in accordance with federal and state noise protection standards in place at the time the construction or operation activity occurs.

	Yes	Maybe	No
6. Aviation Safety. Will the proposed project result in significant impacts related to:			
a. Exposure of people to risk from aircraft operations?			x

SUBSTANTIATION (indicate whether project is located in the Airport Safety Overlay District):

6. a. The project site is not located near any airfields or known aircraft operation routes. The potential impact to aviation safety is nonsignificant and no mitigation is proposed. This issue will not be further considered in an EIR.

	Yes	Maybe	No
7. Hazardous/Radioactive Materials. Will the proposed project result in significant impacts related to:			
a. A risk of an explosion or the release of hazardous substances (including, but not limited to, oil, pesticides, chemicals, or radiation) in the event of an accident or upset conditions?		x	
b. Possible interference with an emergency response plan or an emergency evacuation plan?		x	
c. Creation of any health hazard or potential health hazard?		x	
d. Exposure of people to potential health hazards?		x	

SUBSTANTIATION:

7. a. The potential pathways for release of hazardous substances and their potential to cause a significant health hazard or to expose people to potentially significant health hazards will be examined as part of a public health risk analysis in an EIR. This investigation will include discussion of a procedure to test and handle hazardous wastes delivered to the site that cannot be accepted and disposed of at the site.

7. b. The project site and operations are not located in any area with an emergency response plan or emergency evacuation plan. However, it will be necessary to evaluate the project in the context of existing regional emergency response plans and determine its impact on these plans. The emergency response plan for transport and disposal of wastes delivered to the site will be considered as part of this evaluation in the EIR.

7. c. Refer to the discussion under 7. a. which outlines the potential health hazard investigation that will be included in an EIR.

7. d. Refer to the discussion under 7. a. which outlines the investigation of potential exposure of humans to health hazards that will be included in an EIR.

NATURAL RESOURCES

	Yes	Maybe	No
8. Biological Resources. Will the proposed project result in significant impacts related to:			
a. Loss, reduction, or deterioration of habitat and/or change in diversity of species of plants or animals?		x	
b. Reduction of the numbers of any unique, rare, threatened, or endangered species of plants or animals?		x	
c. Introduction of exotic species of plants or animals into an area, or in a barrier to the normal replenishment or migration of existing species?			x

SUBSTANTIATION (indicate whether project is located in the Biological Resources Overlay or contains habitat for any species listed in the California Natural Diversity Database):

8. a. Development and operation of the repository will cause a reduction in habitat at a location where the diversity of species is not known. A biological resources survey and impact assessment will be included in an EIR to evaluate the potential for significant adverse impact to the resources that will be lost. Endangered and sensitive species will also be surveyed as part of this investigation.

8. b. Refer to the comments under 8. a. which substantiate the need for a biological survey to determine the possible significance of impacts on special species of plants or animals.

8. c. The proposed facility does not include any activities that will introduce exotic species nor does construction and operation pose any barrier to the normal replenishment or migration of existing species. The project will not cause significant impacts in this category of issues and no further evaluation of it will be presented in an EIR.

		Yes	Maybe	No
9.	**Cultural/Paleontologic Resources.** Will the proposed project result in significant impacts related to:			
a.	The alteration or destruction of a prehistoric/ historic archaeological site?			x
b.	Physical or aesthetic effects to a prehistoric or historic building, structure, or object?			x
c.	A physical change that would affect unique ethnic cultural values?			x
d.	Restricting existing religious or sacred uses within the potential impact area?			x
e.	Any alteration or destruction of fossil remains?			x

SUBSTANTIATION (indicate whether the project is located in the Cultural or Paleontologic Resources overlays or cite results of cultural resource review):

9. a. The proposed project is not located in any cultural or paleontologic resources overlay district. This is primarily because (with the exception of studies on the old Tonapah-Tidewater Railroad bed) no surveys have been conducted at the site or in its vicinity. Because the project will disturb

previously undisturbed areas, a complete cultural and paleontological resources survey will be conducted and an impact evaluation provided. Both cultural and paleontological issues will be addressed in an EIR.

9. b. Please refer to 9. a..

9. c. Please refer to 9. a..

9. d. Please refer to 9. a..

9. e. Please refer to 9. a..

		Yes	Maybe	No
10. Air Quality. Will the proposed project result in significant impacts related to:				
a.	Substantial air emissions or deterioration of ambient air quality?		x	
b.	The creation of objectionable odors?		x	
c.	Alteration of air movement, moisture or temperature, or any change in climate, either locally or regionally?			x

SUBSTANTIATION (indicate conformity with the South Coast Air Quality Management Plan, if applicable):

10. a. The primary air pollutant emissions from the project are expected to be particulates, in the form of fugitive dust. The volume of emissions is not yet known and it is possible that emissions may cause local violations of particulate (PM10) standards or they may cause a nuisance. An evaluation of all potential air pollutant emissions and the significance to ambient air quality will be presented in an EIR and submitted to the San Bernardino County Air Pollution Control District for review and comment. Since some of the wastes accepted at the site may have odors associated with them, odors from storing wastes in the repository will also be evaluated and potential significant odor impacts addressed.

10. b. Please refer to the comments in 10. a. which identify potential impacts from odors as a topic that will be evaluated in an EIR.

10. c. Aside from possible minor changes in wind flow around the repository when it is completed (it is anticipated to be about 60 feet high over its extent), no other potential changes in physical climatic variables have been identified.

The potential for significant climate changes is considered nonsignificant because the activities and landscape changes cannot alter local or regional temperatures, rainfall, and humidity. The changes in wind flow around the disposal facility when it is completed will be minor and highly localized. The project does not have the potential to significantly impact climate and this topic will not be further addressed in an EIR.

	Yes	Maybe	No
11. Water Supply/Water Quality. Will the proposed project result in significant impacts related to:			
a. Changes in the quantity of groundwaters, either through direct additions or withdrawals, or through interception of an aquifer by cuts or excavations (onsite)?		x	
b. Substantial reduction in the amount of water otherwise available for public water supplies?			x
c. Alteration of the direction or rate of flow of groundwaters?		x	
d. Pollution, contamination, or any change in the quality of groundwater (toxics, nitrates, fluorides, salts, etc.)?		x	
e. Discharge into surface waters, or any alteration of surface water quality, including, but not limited to, temperature, dissolved oxygen, or turbidity?		x	

SUBSTANTIATION:

11. a. The applicant proposes to utilize the local ground water aquifer as a source of water for construction water, for dust control, for storage to meet fire fighting needs, and for non-potable domestic uses, such as showers, outdoor hose bibs, toilets, etc.. Drinking water will be obtained from bottled water purveyors. The potential impact of ground water extractions is unknown at present in the Broadwell Basin because no data on ground water resources exist. Water supply and potential impacts on ground water aquifers will be evaluated as part of an EIR.

11. b. No water is currently known to be extracted from this basin for public water supplies, therefore it is believed that no potential exists to reduce the amount of water available for public water supplies. This issue poses no adverse impacts and it will not be evaluated in an EIR.

11. c. Because the applicant proposes to utilize local ground water supplies for a majority of its water supply, the potential exists to alter the direction or rate of flow. The potential impact of this issue will be evaluated in an EIR as part of the overall ground water hydrology investigation.

11. d. A key issue of concern with the proposed project is the potential for a significant impact (pollution or contamination) to ground water quality as a result of siting the repository at the project site. The potential for release of pollutants and the potential for significant contamination of ground water resources in the basin will be evaluated in an EIR.

11. e. The possibility of releasing pollutants to surface water during transport and at the project site does exist. In particular, management of onsite surface runoff and release of contaminants to ponded surface water on Broadwell lake bed must be evaluated for potential significant impact in an EIR. This investigation will include an evaluation of the various pathways any contaminants could use to reach surface water from the facility.

		Yes	Maybe	No
12. Open Space/Recreation/Scenic. Will the proposed project result in significant impacts related to:				
a.	The quality or quantity of existing recreational opportunities?		x	
b.	The obstruction of any scenic vista or view open to the public?		x	
c.	The creation of an aesthetically offensive site open to public view?		x	
d.	New light or glare?		x---->	x

SUBSTANTIATION (indicate whether project is located within the viewshed of any Scenic Route listed in the General Plan):

12. a. A review of the Desert Plan (BLM 1980) and conversations with Bureau staff indicate that the Broadwell Basin is occasionally used for low intensity recreation, but it is not an area with high recreation opportunities. Vehicles are restricted to the few roads within the Basin, and the primary uses are to travel north to I-15 or to reach some of the mines in the surrounding Cady or Bristol Mountains. Development of the project will not adversely impact any known recreation values or activities at the project site. Development of the project in the Broadwell Basin is not forecasted to eliminate the

existing recreational opportunities within the remainder of the Basin based on the data available. This issue will be discussed in general in the land use and planning evaluation section of an EIR.

12. b. The development of the project will alter the visual setting of the north part of Broadwell Basin which is visible as a background view from I-40 which is designated as a Scenic Route in the General Plan. Based on this possible sensitivity, a visual evaluation, including visual simulations will be included in an EIR. The potential for disrupting an important public view will be fully addressed in the EIR.

12. c. Refer to the comments in 12. b. which indicate the visual evaluation in an EIR will include the possibility of creating aesthetically offensive facilities in a public viewshed.

12. d. The facility will not be operated at night (except in an officially defined emergency) and night lighting will be minimized to prevent any significant light or glare in the Broadwell Basin. The potential impact from such lighting can be kept at a nonsignificant level. To accomplish this the applicant shall submit a lighting design and installation plan that will direct light internally and prevent light or glare from extending beyond the property boundaries. Also, no routine operations shall be conducted after dark, except during emergencies as defined in the operations plan. With implementation of these mitigation measures the impact from light and glare will be nonsignificant. This issue will not be addressed further in an EIR.

	Yes	Maybe	No
13. Soils/Agriculture. Will the proposed project result in significant impacts related to:			
a. Disruptions, displacements, compaction, or overcovering of the soil?		x	
b. Loss of agricultural soils?			x
c. Reduction in acreage of any agricultural crop?			x

SUBSTANTIATION (indicate whether project is located in the Important Farmlands Overlay):

13. a. Soils will be displaced, compacted, and overcovered on the clay lake bed and adjacent alluvium as one component on constructing the repository and support facilities. Concerns have been expressed over the ability to compact the clay and maintain an adequate moisture content in the clay to prevent cracking. This issue poses potential significant impacts and will be

evaluated in an EIR.

13. b. The project site is not located within the Important Farmlands Overlay to the General Plan. The loss of the soils that will be covered and utilized for construction and operations does not include any agriculturally important soils. Both the alluvial soils and clay lake bed soils are given low Land Use Capability designation (Classes VI and VIII) based on a literature review of similar soils (Cajon and Playa soils, due to lack of irrigation water and lack of productivity, respectively) in the "Soil Survey of Survey of San Bernardino County California, Mojave River Area." This issue does not pose any significant impacts and it will not be evaluated in an EIR.

13. c. No agriculture is practiced in the Broadwell Basin. The proposed project cannot reduce the acreage of any agricultural crop. This issue will not be evaluated in an EIR.

	Yes	Maybe	No
14. Mineral Resources. Will the proposed project result in significant impacts related to:			
a. The prohibition or restriction of development of any mineral resource rated as Classified or Designated by the State Mining and Geology Board?		x	

SUBSTANTIATION (indicate whether project is located within the Mineral Resource Zone Overlay):

14. a. None of the area directly impacted by the proposed project is identified in the General Plan or on State Minerals Maps as a Mineral Resource Zone (MRZ). The project will consume clay from the lake bed and local sand and gravel resources for construction and operating purposes. As part of the geologic and land use evaluations in the EIR, the mineral resource issue will be evaluated and any potential significant impacts to mineral resource access will be addressed.

MANMADE RESOURCES

	Yes	Maybe	No
15/16. Utilities/Infrastructure. Will the proposal result in significant impacts related to a need for new systems, or substantial alterations to the following utilities:			
a. Power or natural gas?		x---->	x
b. Communications systems?		x---->	x

		Yes	Maybe	No
c.	Water?			x
d.	Sewer?		x---->	x
e.	Storm water drainage?		x	
f.	Solid waste (non-hazardous) and disposal?			x

SUBSTANTIATION:

15/16. a. The project will not require connection to any natural gas delivery systems. If gas is used at the site, bottled gas will be purchased and delivered to the site on an as needed basis. Adequate commercial sources exist in Barstow to meet the demands for the few structures that will be located at the project site. No further evaluation of this issue will be presented in the EIR.

The applicant will install electrical lines (or have then installed by Edison) from Ludlow to the project site (approximately 9 miles) underground. The system is adequate to serve the needs of the two or three structures and water well that will be located at the project site. Any new electrical facilities required, such as transformers, will be installed at the applicant's cost and will not require significant new systems to be constructed. This issue will not be evaluated in an EIR.

15/16. b. The communications system is expected to be a combination of radios and telephone. A telephone cable will be extended to the site in the same trench as the power line. The communications system has the ability to provide a few more numbers in the project area without expanding it. No significant impact is identified and this issue will not be addressed in an EIR.

15/16. c. The applicant must install its own water system based on development of the local ground water aquifer. No existing utility will be impacted by the proposed project and the water supply issues related to the ground water aquifer will be evaluated separately as part of the hydrology evaluation. No significant impact to any existing system is possible and this issue will not be evaluated in an EIR.

15/16. d. Domestic liquid wastes will be handled by a septic tank/leach system which will be installed on the alluvium in accordance with County Department of Environmental Health Services requirements. Analyses of the alluvial soil (Rasmussen 1989) indicate it has adequate permeability to meet the County's requirements. No existing sewer systems will be impacted and this issue will not be evaluated in an EIR.

15/16. e. No existing storm water drainage systems exist in Broadwell Basin. The project will have to develop such a system to specifically serve the facility and this issue is being reviewed as part of the hydrology investigation. Potential significant impact to the existing drainage exists and this issue will be evaluated in a Focused EIR.

15/16. f. Domestic solid waste from the facility will be collected in a dumpster. The facility is projected to generate approximately eight cubic yards of domestic solid waste per week. This is a minor amount (less than a commercial mini-market) that will be delivered to the nearest Class 3 landfill (near Barstow) by the applicant or a contractor, if one is available. Chemical laboratory wastes will be collected and delivered to a disposal site with appropriate permits or treated and delivered to such a site. The operations plan will provide procedures for ensuring that the wastes (including wastes destined for the repository) are not inadvertently disposed in the domestic waste stream. Based on the procedures outlined above, the proposed project will not have a significant adverse impact on the existing solid waste disposal system.

		Yes	Maybe	No
17. Transportation/Circulation. Will the proposed project result in significant impacts related to:				
a.	Generation of substantial additional vehicular movement?		x	
b.	Effects on existing parking facilities, or demand for new parking?			x
c.	Substantial impact upon existing transportation systems?		x	
d.	Alterations to present patterns of circulation or movement of people and/or goods?		x	
e.	Alterations to waterborne, rail, or air traffic?			x
f.	Increase in traffic hazards to motor vehicles, bicyclists, equestrians, or pedestrians?		x	

SUBSTANTIATION:

17. a. The proposed project will generate an estimated maximum 130 trips (260 total trips on the road) to the project site per day. The additional trips will

occur on Interstate 40 which is currently operating at a Level of Service "A" (BSI 1989) and the new two lane road to the site can handle several thousand trips per day before approaching its capacity. Based on the available data, the traffic generated by the project may be categorized as "substantial." The topic of road capacity and traffic flow will be addressed in a traffic investigation that will be incorporated into the EIR.

17. b. The project operations will not affect any existing parking areas and sufficient parking area will be provided to handle the vehicles that may be parked at the project site. Space will be provided for 100 trucks to park adjacent to the repository. No potential significant adverse impacts are associated with this issue and it will not be evaluated in an EIR beyond confirming adequate parking space as outlined above.

17. c. The transport of treated hazardous wastes to the project site has been identified by the public as one of the major environmental issues associated with the project. Because of the concerns for potential accidents and traffic management to the site, a full traffic investigation will be included in an EIR.

17. d. If the site is approved and residual hazardous wastes are delivered to the site for emplacement in the repository, the present pattern of hazardous waste transport will be altered. This issue will also be addressed in an EIR to determine whether altering the present pattern poses any potential significant adverse impacts.

17. e. The proposed project does not involve waterborne, rail, or air traffic. No potential impacts are possible and this issue will not be evaluated in an EIR.

17. f. Refer to comments in 17. c. and 17. d. which discuss the need to evaluate accident potential attributable to this project in an EIR.

	Yes	Maybe	No
18. Energy. Will the proposed project result in significant impacts related to:			
a. An increase in the rate of consumption of any natural resources?		x	
b. Use of substantial amounts of fuel or energy?			x
c. Substantial increase in demand upon existing sources of energy, or require the development of new sources of energy?			x

SUBSTANTIATION:

18. a. Development of the repository will increase the use of certain natural resources. The consumption of water will increase and may be significant, but it is being reviewed under the hydrology section of an EIR. Local clay and sand and gravel resources will be utilized. Approximately 2.5 million cubic yards of clay will be needed over the life of the project if one of the liners is constructed with clay, as proposed. Scraping three feet off of one section of Broadwell dry lake bed would provide approximately 3 million cubic yards. The several hundred thousand cubic yards of sand and gravel is available at numerous locations through the basin. These operations will require compliance with the State Mining and Reclamation Act (SMARA). The consumption of these natural resources may be significant and their utilization will be evaluated in an EIR, including extraction operations. The construction of structures and other support facilities will utilize other natural resources (iron, wood, etc.), but for two structures and a few shallow wells the volume of materials required is not judged to create a significant impact on these natural resources based on their relatively high availability from commercial sources. The consumption of these resources will not be addressed in an EIR.

18. b. The repository will provide an alternative to the existing hazardous waste disposal sites in the state and those out of state. The distance from southern California to the project site ranges from 120 (San Bernardino area) to 210 (San Diego) miles which is equal to or slightly less than the distance to existing in-state disposal sites. Overall the volume of fuel required to dispose of treated residuals should be about the same or reduced by a small amount relative to existing disposal travel. The two structures on the property may consume 30,000 kWh per year between them and this is negligible in a system that is projected to meet energy needs through the turn of the century (CEC 1986). Based on available data, the project will not cause a substantial increase in fuel and energy use. These topics will not be given further review in an EIR.

18. c. Refer to comments in 18. b.. The proposed project will not require substantial energy or fuel resources and no new sources of energy will need to be developed to meet project demand. This issue will not be evaluated in an EIR.

	Yes	Maybe	No
19. **Housing/Demographics/Socioeconomics.** Will the proposed project result in significant impacts related to:			
a. An effect on existing housing, or creation of a demand for additional housing?			x

	Yes	Maybe	No
b. Alteration of the location, distribution, density, or growth rate of the human population of the area?			x

SUBSTANTIATION:

19. a. An estimated 30 persons will be permanently employed at the repository. They will have the opportunity to live at several locations from Barstow east to Ludlow as reasonable commuting distance. A review of the recent Growth Management Plan completed by the Southern California Association of Governments (SCAG) indicates that more jobs are needed in the San Bernardino Desert (which includes the whole area north and east of the mountains) in order to provide a better jobs-housing balance with its 1:1 ratio of new jobs to potential new residents (page VII-6, SCAG 1988). This project is consistent with this policy objective. Thus, the project does not cause a significant impact relative to growth in population and housing of the region. This topic will not be evaluated in an EIR.

19. b. The project will not result in providing new residences or changing densities or growth rates of the area's population. The Growth Management Plan (page VII-8, SCAG 1988) envisions a population increase of about 222,000 between the present and the year 2010. Assuming 3 persons per new employee relocate to the desert, this represents 90 new residents. Relative to the annual average growth of about 11,100 in the desert. This project does not cause a significant impact to population location and will not be evaluated in an EIR.

	Yes	Maybe	No
20. Public Services. Will the proposed project result in significant impacts related to a need for new or altered governmental services in:			
a. Fire protection?		x----->	x
b. Police protection?		x---->	x
c. Schools?			x
d. Parks or other recreational facilities?			x
e. Maintenance of public facilities, including roads?			x
f. Other governmental services?		x----->	x

SUBSTANTIATION:

20. a. The proposed project is located approximately 30 miles from the nearest fire station that could respond to a structural fire at the repository. The applicant must provide sufficient water storage to meet fire flow requirements for the structures ultimately constructed. Initially, it is planned to install a 20,000 water storage tank. Because of delayed arrival of the nearest fire suppression forces, the applicant will maintain fire suppression equipment at the site and provide training for the employees to respond to a fire. In addition, the applicant shall construct the facility with components that minimize fire hazard, in accordance with consultation and concurrence from the County Fire Warden's Office. Although the facility will be disposing of hazardous wastes, these wastes will not be flammable or ignitable. By implementing these measures the impact on fire protection services can be reduced below a significant level. This issue will not be evaluated in an EIR.

20. b. The project site will be surrounded by a security fence and will be manned by a 24-hour security force. Operations at the site may increase the demand for law enforcement services, but no significant potential increase is identifiable. This issue will not be evaluated in an EIR.

20. c. The Silver Lakes School District and Barstow Unified School District are expected to provide educational services for children of employees at the repository. An estimated 30 employees may relocate to the region and 30 school age children may be generated by this relocation within the above school districts and others in the surrounding area (such as Helendale). The addition of 30 students in the region is less than would occur from a 50 unit subdivision and is not considered to create a significant impact on the region's education system. This issue will not be evaluated in an EIR.

20. d. The project site does not directly impact any park or recreation facilities. The addition of 30 possible families to the region is not considered a significant increase in demand for use of recreation facilities of the region based on the small increase relative to the area's population. This issue will not be evaluated in an EIR.

20. e. No additional measurable demand will be placed on maintenance of existing public facilities. The road to the project site will be public but it will be maintained by the applicant. Thus, no impact is projected under this topic. This issue will not be evaluated in an EIR.

20. f. The project may place additional demand on the County Department of Environmental Health Services for review and inspection of disposal operations. The applicant shall mitigate this potential impact by providing

funding for County staff effort, as part of fees accepted at the site. The impact to other governmental services remains to be defined. This issue will be evaluated in an EIR based on the input received during the scoping process.

LAND USE

	Yes	Maybe	No
21. Will the proposed project result in significant impacts related to:			
a. A substantial alteration of the present or planned land use of an area (consider the Official Land Use Designation of the project site and surrounding property, as well as their Improvement Level designations on the General Plan Infrastructure Overlay and any relevant Resource Overlays?	x		

SUBSTANTIATION:

21. a. Development of the repository in Broadwell Basin will introduce a new use into the area that can be considered a substantial alteration of the present and planned uses in the Basin. A detailed land use evaluation will be presented in an EIR that will evaluate BLM, County, and other pertinent plans for the region. The evaluation will assess the proposed repository in relation to the siting criteria for Specified Hazardous Waste Facilities contained in the Draft, or Final, CHWMP if it is completed by the time a decision is made on the project. It will also address the potential for significant land use conflicts and land use incompatibilities.

22. MANDATORY FINDINGS OF SIGNIFICANCE

		Yes	Maybe	No
a.	Does the project have the potential to degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below selfsustaining levels, threaten to eliminate a plant or animal community, reduce the number or restrict the range of a rare or endangered plant or animal or eliminate important examples of the major periods of California history or prehistory?		x	
b.	Does the project have the potential to achieve short-term, to the disadvantage of long-term, environmental goals? (A short-term impact on the environment is one which occurs in a relatively brief, definitive period of time while long-term impacts will endure well into the future.)		x	
c.	Does the project have impacts which are individually limited, but cumulatively considerable? (A project may impact on two or more separate resources where the impact on each resource is relatively small, but where the effect of the total of those impacts on the environment is significant.)		x	
d.	Does the project have environmental effects which will cause substantial adverse effects on human beings, either directly or indirectly?		x	

SUBSTANTIATION: The proposed Broadwell Basin Residuals Repository will introduce a new use into the project area and convert approximately 230 acres from relatively undisturbed open space to repository land use. Because the area is relatively undisturbed, very little quantitative or scientific data are available on many site specific resources. This Initial Study identifies most of the site specific resource issues, such as biology, geology, hydrology, and cultural resources, as topics that require further investigation before a final determination of significant impact can be rendered. In addition, the disposal of hazardous wastes by placing them in a residuals repositor involves activities that pose potential hazards along transport routes and at the site. These issues will also be evaluated in an EIR in order to determine their potential significance. The following issues will be addressed in an EIR on the proposed project: Geologic Hazards, Flood Hazards, Wind/Erosion, Noise, Hazardous Materials, Biological Resources, Cultural/Paleontologic Resources, Air Quality, Water Supply/Water Quality, Scenic/Visual Resources, Soil Engineering

Properties, Transportation/Circulation, and Land Use. Cumulative impacts of other waste disposal projects in the region will be evaluated.

III. Discussion of Environmental Evaluation:

Please refer to the substantiation discussion above.

IV. Mitigation Measures to be included in project Conditions of Approval and addressed in Mitigation Monitoring Program:

Noise

1. The applicant shall supply and require all employees exposed to noise levels that pose damage to human hearing to wear hearing protection devices in accordance with federal and state noise protection standards in place at the time the construction or operation activity is in progress.

Lighting

2. The applicant shall submit a lighting design and installation plan that will direct light onto the property and minimize light or glare extending off the project site. This plan shall be reviewed by San Bernardino County and when a plan is approved, the applicant shall construct the lighting in accordance with it.
3. No routine disposal operations shall be conducted after dark. Operations conducted in support of an officially defined emergency are permitted after dark.

Power

4. Electrical power lines to the site shall be placed underground.

Communications

5. Telephone land lines shall be placed underground.

Sewer

6. The applicant shall install a septic tank/leach system in accordance with County Department of Environmental Health Services requirements in place at the time the facility is constructed.

Fire Protection

7. The applicant shall install a water storage tank that will meet fire flow requirements for the number and type of structures constructed at the repository. The size of the tank shall be determined in consultation with the County Fire

Warden's Office.

8. The applicant shall maintain adequate fire fighting equipment to respond to fires in the structures constructed at the site and shall train company personnel in its use.

9. The facility structures shall be constructed with components that meet the County Fire Warden's requirements for minimizing the spread of a fire. The type of construction material shall be determined in consultation with the County Fire Warden's Office.

Police Protection

10. The applicant shall fence the total facility with fencing materials approved by the County and shall maintain a 24 hour presence at the project site.

Other Governmental Services

11. The applicant shall arrange to fund County inspection efforts at the Broadwell Basin Residuals Repository. The amount and method of funding shall be determined in consultation with the County Department of Environmental Health Services.

Additional mitigation measures will be defined and imposed on this project during the CEQA review process and in the EIR.

Initial Environmental Evaluation Prepared By:

10-17-89
Date

Mike Williams
Signature

On the basis of this initial evaluation:

The proposed project WOULD NOT have a significant effect on the environment, (and Mitigation Measures are included within the project's Conditions of Approval and Mitigation Monitoring Program) and a NEGATIVE DECLARATION should be prepared.

The proposed project MAY have a significant adverse effect on the environment, and an ENVIRONMENTAL IMPACT REPORT should be required. X

10-17-89
Date

Paul O.
Signature

For-San Bernardino County Office of Planning

REFERENCES

1. Rasmussen, Gary S., 1988. Preliminary geology investigation, proposed residuals repository, Section 25, T9N, R7E, west margin of Broadwell Dry Lake, north of Ludlow, CA.

2. Stirrat, Bryan A., 1988. Hydrology Study Report, Broadwell Corporation Residual Repository, San Bernardino County, California

3. Van Houten & Associates, J. J., 1988. Draft Noise Element and Background Reports, San Bernardino County General Plan Update

4. San Bernardino County, 1989. San Bernardino County General Plan, Adopted July 1989

5. San Bernardino County, 1989. San Bernardino County Hazardous Waste Management Plan (Revised Draft)

6. Thomas Bros. Maps, 1989. San Bernardino & Riverside Counties 1989 Thomas Guide

7. Bureau of Land Management, 1980. The California Desert Conservation Area Plan

8. Soil Conservation Service, 1986. Soil Survey of San Bernardino County California, Mojave River Area

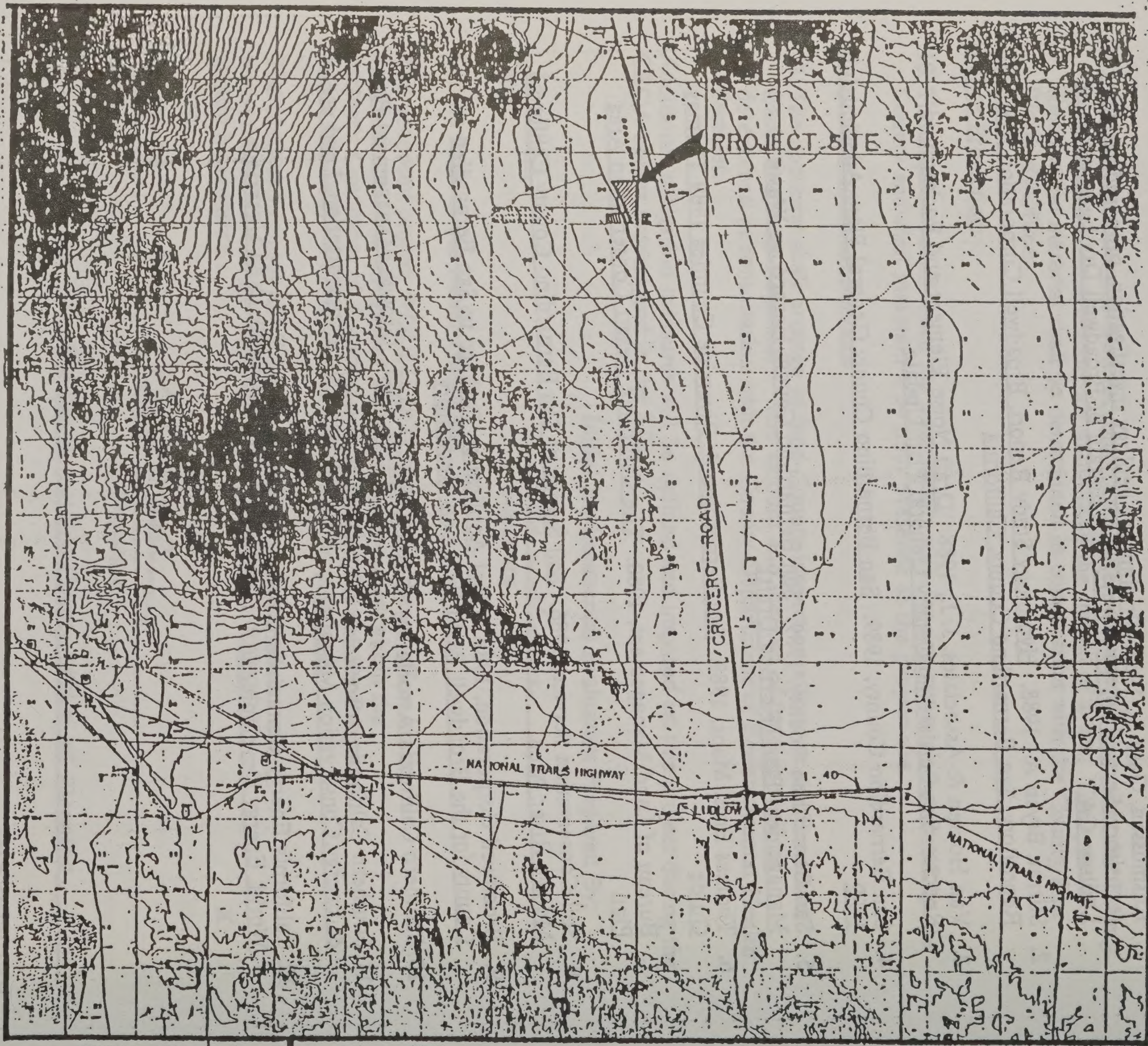
9. Broadwell Corporation, 1989. Final Application Package to San Bernardino County for the Broadwell Basin Residuals Repository

10. Southern California Association of Governments, 1988. Growth Management Plan

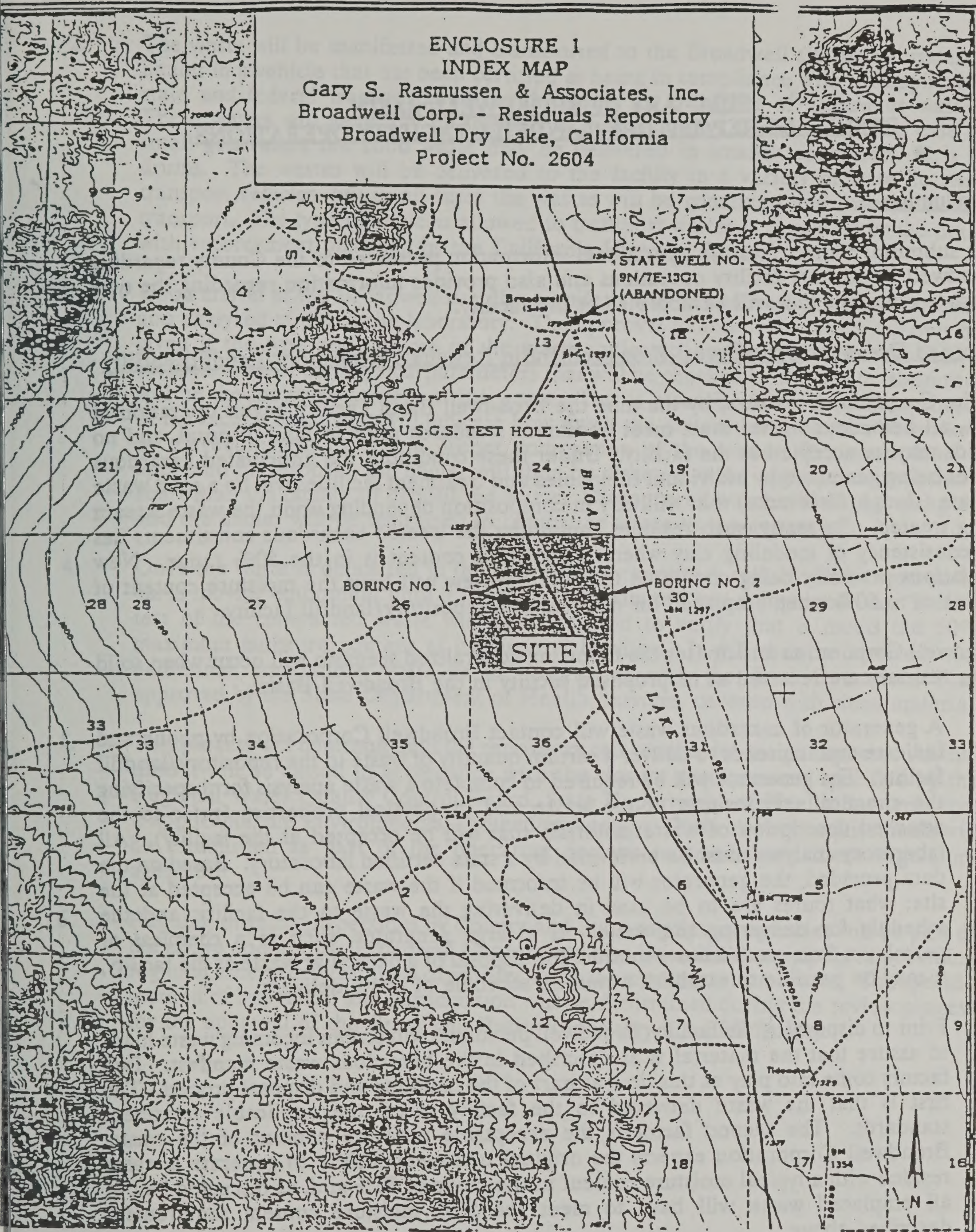
11. Southern California Association of Governments, 1988. Transportation, Land use & Energy Conservation Measures

12. California Energy Commission, 1986. Affordable Electricity in an Uncertain World, Energy Development

SITE VICINITY MAP



ENCLOSURE 1
INDEX MAP
Gary S. Rasmussen & Associates, Inc.
Broadwell Corp. - Residuals Repository
Broadwell Dry Lake, California
Project No. 2604



ase Map: USGS Cady Mountains and
Broadwell Lake 15 min.
Series Quadrangles

Scale: 1" = 1 mile

SUMMARY OF BROADWELL BASIN RESIDUALS REPOSITORY/LANDFILL FACILITY OPERATIONS

Introduction

This submittal summarizes the operational information presented to the County regarding Broadwell Repository facility operations and also provides information regarding the type of waste materials that will be accepted at the facility.

Proposed Operation Procedures: Broadwell Basin Residuals Repository/Landfill Facility

As the County is now aware, by the time the Broadwell Basin Facility begins operation in 1991, all hazardous wastes must meet treatment standards prior to land disposal, and no liquids may be accepted at the facility. Under these conditions the anticipated hazardous wastes being generated by individual companies and treatment facilities will be a solid waste residue (sludge/filter cake) that will vary in composition depending upon the waste stream being treated. Currently, such residues containing the treated hazardous constituents has the consistency of modeling clay when its moisture content is in the 50% range. New regulations presently being circulated for public review will limit the moisture content of all wastes to 50% when emplaced for disposal at a repository/landfill facility.

Broadwell Corporation anticipates the following generalized scenario will occur when solid waste residues are received at its proposed facility in the Broadwell Basin:

1. A generator of hazardous waste will contact Broadwell Corporation by phone and indicate that it intends to deliver a certain quantity of waste to the repository/landfill facility. The generator will be required to complete a waste analysis form specifying the chemical composition of the waste and its physical properties (refer to the attached description of waste materials that will be accepted at the facility). All laboratory analyses must be performed by a state certified laboratory. Based on the data provided, the generator will be informed if the waste can be accepted at the site; what routes are to be used in delivering the waste to the facility; and the schedule for delivering the waste. If a large generator, such as a chemical or petroleum firm, establishes a contract for disposal of a particular waste at the facility, it may be possible to establish a routine schedule of waste delivery.

   Prior to disposal at the facility, Broadwell personnel will screen incoming waste loads to assure that the material is as described in the hazardous waste manifest. Two factors come into play at this time as part of the handling and disposal process. The first is that the waste delivered to the facility meets the applicable treatment standards. The second factor is the acceptable moisture content of the waste. Broadwell Corporation expects the original treatment facility to generate a waste residue with a typical moisture content in the range of 50% and, as discussed below, all emplaced waste will have to meet the 50% moisture content requirement described above.

2. The waste will be manifested and transported to the Broadwell site by a registered hauler in a vehicle that has been certified as being in compliance with the applicable state and federal transportation requirements for transport of hazardous wastes. These wastes will generally be shipped in bulk quantity. However, in the case of small generators the solid waste may be delivered in smaller containers, such as drums. The wastes will be delivered to the facility in a variety of state licensed transport vehicles, but in all cases the wastes will be contained and covered during transport. The type of vehicles allowed to transport wastes is regulated by the State with enforcement provided by the California Highway Patrol.

3. Upon arrival at the Broadwell site, the manifests will be checked, the waste sampled and analyzed at the onsite laboratory. The approval to accept the waste will only be given if the type and volume of the waste indicated on the transport manifest is verified. One of the physical parameters that will be checked by the onsite laboratory will be the moisture content of the waste. This is essential to the handling process at the facility because it will indicate how much the material will have to be worked by the equipment to ensure proper compaction of the waste. If a waste load is approved for disposal, the hauler will then be directed to the appropriate repository cell within the facility to deposit the waste. Disapproved waste will not be accepted and the hauler will be instructed to return the waste to the generator.

4. Once the waste is deposited in the appropriate repository cell, it will be worked by earth moving equipment until it is properly distributed and compacted. An "in situ" test of the compacted waste will be conducted to verify that it meets the 50% maximum moisture content at its disposal location. It will then be covered with additional, compatible waste or in accordance with the final Operations Plan approved by the State Department of Health Services, covered with clean material.

5. This process will continue until the repository cell reaches its design capacity. At that time it will be closed in accordance with the closure requirements specified by the Regional Water Quality Control Board, State Department of Health Services, and, if applicable, the Environmental Protection Agency. These closure requirements will be established as part of the operating permits received from these regulatory agencies.

6. Regular, ongoing inspections by County and State regulatory agencies will be part of the above operations. Broadwell Corporation also intends to participate in providing regional emergency response capability along the transportation routes. The specific method of inspection and participation will be determined during the review process for the approval of the Broadwell Basin Repository/Landfill facility.

United States Department of the Interior

BUREAU OF LAND MANAGEMENT
BARSTOW RESOURCE AREA
150 COOLWATER LANE
BARSTOW, CALIFORNIA 92311-3221

(619) 256-3591

89 NOV 27 :13

IN REPLY REFER TO:

1700/2200
8500 WSA 252
(CA-068.28)

NOV 22 1989

[redacted]
Land Management Department
County of San Bernardino
385 North Arrowhead Avenue
San Bernardino, CA 92415-0180

Dear Mr. Kielhold:

The purpose of this letter is to outline the federal requirements of an environmental document regarding the Broadwell Corporation Hazardous Waste Repository that will satisfy the National Environmental Policy Act (NEPA), the Endangered Species Act Section 7 consultation with the U.S. Fish and Wildlife Service (FWS), and BLM procedures regarding material sales, and right-of-ways for access, power and telephone lines. This document, a joint EIR/EA, will also comply with the California Environmental Quality Act (CEQA). A joint environmental document is specifically encouraged by both the State CEQA Guidelines (section 15170) and the Council on Environmental Quality (CEQ) Regulations (Part 1506.2) as a means of reducing paperwork and providing for cooperation among federal and local agencies.

To meet NEPA, the following proposed actions will need to be defined and analyzed:

(1) - right-of-way grants for the access road, the powerline and the telephone line, and;

(2) - a material sales application.

NEPA requires that the following items must be considered during the analysis process:

- threatened and endangered species;
- floodplains and wetlands;
- wilderness values;
- Areas of Critical Environmental Concern (ACEC);
- visual resource (quantity and quality);
- water quantity and quality;
- air quality; and
- cultural or historical resource values.

TAKE PRIDE IN AMERICA

Only those items which are or could be impacted require discussion in the document. When the size, location, or nature of the proposal makes it reasonable to assume that any item might be impacted or when a high level of controversy is expected, at minimum, a negative declaration is required in the document.

The items identified in the Environmental Initial Study should be able to incorporate and meet all of the federal NEPA requirements.

Section 7 consultation with the FWS regarding the desert tortoise will need to be initiated. The FWS has stated that a federal agency is preferred to be the lead agency in consultation. As the involved federal agency, this office will be the lead on consultation. Consultation will cover the entire scope of a project even though only a portion of the project may be directly subject to federal discretionary action (50 CFR 402.02).

Please contact Sharon Paris of this office regarding this project. She will be available to meet with you to discuss further details or data needs.

Sincerely,

Alden Sievers

Alden Sievers
Area Manager

United States Department of the Interior

FISH AND WILDLIFE SERVICE

FISH AND WILDLIFE ENHANCEMENT FIELD STATION
Federal Building, 24000 Avila Road
Laguna Niguel, California 92656

In Reply Refer To:
FWS/LNFO (1-6-90-TA-48)

November 28, 1989

[redacted]
Land Management Department
County of San Bernardino
385 N. Arrowhead Avenue
San Bernardino, California 92415-0182

Dear Mr. Kielhold:

The Fish and Wildlife Service (Service) has reviewed the notice of preparation of a draft environmental impact report for the Broadwell Corporation Hazardous Waste Repository. The proposed project, which would be located in the Broadwell Valley, 10 miles north of Ludlow, in San Bernardino County, would consist of 230 acres of disposal area above ground and support laboratory and maintenance structures on adjacent alluvium. Eight miles of paved road will be constructed from Ludlow to the site.

The Service believes the following issues should be thoroughly addressed in the draft report:

✓ 1. The draft report should fully describe the biological resources of the project area and provide lists of the plant and animal species which can occur on-site. Particular emphasis should be placed on sensitive species, such as Federal and State listed and candidate species. This analysis should include the desert tortoise (Xerobates agassizii) which is a federally listed endangered species. Because Section 9 of the Endangered Species Act prohibits the take of listed species, the field studies involved with the proposed project should be thorough enough to ensure that no individuals of the species are adversely affected. Should evidence of tortoises be found, the Service should be contacted by the lead Federal agency, if a Federal connection is involved in project development; otherwise, the applicant should contact us to determine the need for a Section 10(a) permit.

Additionally, the draft report should consider the impact of the proposed project on the flora and fauna of the lake bed itself and the species which depend on them. Desert playas often support an array of species which lie dormant in the sediments of the lake surface until the lake is flooded. After rains, these species emerge, breed, and reburrow before the lake again dries.

During times of inundation, desert lakes form important resting and feeding places for migratory shorebirds and waterfowl.

2. The report should also describe the potential impacts to resident and migratory species and the measures which will be included as part of the project to mitigate these impacts. The impact analysis should also include the indirect effects of altering the sheet flow often found on alluvial fans.

3. Projected water use by the proposed project and its effects on the area's biological communities should be discussed. The report should also evaluate the cumulative impacts of water use in this arid region and the Mojave River valley to determine whether the proposed project could have an impact on the Mohave tui chub (Gila bicolor mohavensis), a federally listed endangered species which inhabits springs and ponds at Soda Dry Lake.

4. The report should examine the potential impacts of hazardous waste disposal on surrounding natural areas. Means of mitigating these impacts should be investigated and presented in the draft report.

5. Preparers of the report should be aware of the requirements of the Clean Water Act with regard to the placement of fill material in waters of the United States and wetland areas. The U.S. Army Corps of Engineers (Corps) administers the Section 404 program of the Clean Water Act and has considered dry lakes to be waters of the United States. As part of the Corps' permitting procedure for this project, should it go forward, the Fish and Wildlife Service and the Environmental Protection Agency would provide comments to the Corps regarding the adequacy of the impact analysis and the associated mitigation measures. For the purposes of this public review, the applicant should also provide a full alternatives analysis. For further information, please contact:

U.S. Army Corps of Engineers
P.O. Box 2711
Los Angeles, California 90053
Attn: Regulatory Branch
(213) 798-5606

6. The draft report should consider the indirect and cumulative impacts of the project on surrounding natural habitats. These impacts include, but are not limited to, increased human populations, increased pet and feral animal populations, noise, lighting, and trash.

7. The report should consider project alternatives, especially if the environmental impacts of the proposed project can not be avoided or mitigated to insignificance.

The Service appreciates the opportunity to participate in your planning process. If you have any questions, please contact Ray Bransfield of my staff at FTS 796-4270 or (714) 643-4270.

Sincerely,

Brooks Harper

Brooks Harper
Acting Field Supervisor

STA OF CALIFORNIA—THE RESOURCES AGENCY
GEORGE DEUKMEJIAN, *Governor*

DEPARTMENT OF FISH AND GAME
330 Golden Shore, Suite 50
Long Beach, CA 90802
(213) 590-5113

89 NOV 21 AM 9:54

November 20, 1989

[redacted]
385 N. Arrowhead Avenue
San Bernardino, CA 92415-0182

Dear Mr. Kielhold:

We have reviewed the Notice of Preparation of an EIR for the Broadwell Corporation Hazardous Waste Repository Project (SCH 89020054) consisting of approximately 230 acres of disposal area on the northwest edge of Broadwell Dry Lake located eight miles from the community of Ludlow. We recommend that the following issues be addressed in the document:

1. A complete assessment of flora and fauna within and adjacent to the project area with particular emphasis upon identifying endangered, threatened, and locally unique species and sensitive and critical habitats.

2. A discussion of direct, indirect, and cumulative impacts expected to adversely affect biological resources with specific measures to offset such impacts. Of particular concern are potential cumulative impacts to any aquatic organisms indigenous to Broadwell Dry Lake. Disruption of the dry lakebed environment and adjacent areas could adversely affect them. Although the office/maintenacnce facility, the borrow area for alluvial material and its haul road, and the improvements to Crucero Road are outside the margin of the dry lake impacts of these developments on biological resources should be evlauated and mitigation/compensation measures be provided. An assessment of potential impacts to desert wildlife due to increased traffic on Crucero Road should be evaluated and measures to mitigate such impacts should be provided.

3. A description of the types of hazardous material that would disposed of at the repository.

4. A discussion of potential adverse impacts from any increased runoff, sedimentation, soil erosion, and/or pollutants to Broadwell Dry Lake.

More generally, there should be discussion of alternatives to not only minimize adverse impacts to biological resources but to include direct benefit to wildlife and wildlife habitat.

Diversion, obstruction of the natural flow or changes in the bed, channel, or bank of any river, stream, or lake will require notification to the Department of Fish and Game as called for in the Fish and Game Code. This notification (with fee) and the subsequent agreement must be completed prior to initiating any such changes. Notification should be made after the project is approved by the lead agency.

Thank you for the opportunity to review and comment on this project. If you have any questions, please contact Jack L. Spruill of our Environmental Services staff at (213) 590-5137.

Sincerely,

Bruce E. [illegible] for

Fred Worthley
Regional Manager
Region 5

cc: F. Hoover

STATE OF CALIFORNIA—BUSINESS, TRANSPORTATION AND HOUSING AGENCY GEORGE DEUKMEJIAN, *Governor*

DEPARTMENT OF TRANSPORTATION
DISTRICT 8, P.O. BOX 231
SAN BERNARDINO, CALIFORNIA 92402
TDD (714) 383-4609

89 DEC -6 PM 1:53

December 4, 1989

08-SBd-40-49.9
SCH #89020054

Mr. Paul Kielhold
County of San Bernardino
385 North Arrowhead, 3rd Floor
San Bernardino, CA 92415

Dear Mr. Kielhold:

We have reviewed a Notice of Preparation of a Draft Environmental Impact Report for Broadwell Hazardous Waste Repository and request consideration of the following:

Due to the dangerous nature of hazardous waste, we request that all related trips in the urban area be made outside of the peak period. In addition, procedures concerning accidental spillage should be addressed.

We urge early and continuous liaison with Caltrans on proposed plans as they affect State highways.

If you have any questions, please contact Richard Malacoff at ATSS 670-4550 or (714) 383-4550.

Very truly yours,

Harvey J Sawyer

HARVEY J. SAWYER
Chief, Transportation Planning
Branch B

STATE OF CALIFORNIA

George Deukmejian, Governor

AIR RESOURCES BOARD
1102 Q STREET
P.O. BOX 2815
SACRAMENTO, CA 95812

89 DEC 18 PM 2:42

December 12, 1989

[redacted]
San Bernardino County
385 N. Arrowhead Avenue
San Bernardino, CA 92415-0182

Dear Mr. Kielhold:

San Bernardino County Notice of Preparation for the Broadwell Hazardous Waste Repository SCH# 89020054

We have reviewed the notice of preparation of a draft environmental impact report (EIR) by the San Bernardino County for the Broadwell Hazardous Waste Repository. The notice of preparation states that the proposed project could result in detrimental effects on air quality. To enable adequate analysis of potential air quality impacts, we recommend that the draft EIR contain at least the following information:

1. A description of the proposed project including:
    a. The construction plan including any excavation;
    b. Types and quantities of wastes to be handled;
    c. Technical information on storage, recycling, treatment, and disposal operations;
    d. Characterization of any landfill gas and any fuels to be used in the proposed project;
    e. Capacity and acceptance rate for the proposed facility; and
    f. Expected date of start-up.
2. A description of the existing environmental setting at the proposed project site and adjacent areas including:
    a. Location;
    b. Meteorology and topography;

c. Current background and onsite air quality, including information on ambient air concentrations of criteria and non-criteria pollutants;

d. Population distribution and the proximity of sensitive populations (e.g., residential areas, schools, hospitals);

e. Existing sources of air pollution in the vicinity of the proposed project;

f. Identification of environmental biota capable of bioaccumulating emissions through potential pathways of exposure; and

g. Identification of all indigenous plant and animal species and habitats which may be adversely impacted, directly or indirectly by deterioration of air quality.

3. An analysis of the potential air quality impacts due to proposed project activities including:

   a. Construction of the project;

   b. Vehicular traffic;

   c. Operation of the facility;

   d. Transportation, storage, handling, treatment, recycling, or disposal of hazardous wastes; and

   e. Accidental releases.

This analysis should include both criteria air pollutants for which ambient air quality standards exist and non-criteria air pollutants from the facility. The analysis should also include estimates of average and highest controlled and uncontrolled emission rates of criteria and non-criteria air pollutants, and the basis for the assumptions and calculations used to determine these estimates. There should be a discussion of methods of estimating emissions, their levels of error and method selection. The methods of Shen (1982) and Hwang (1986) (references attached) are examples for estimating the volatile emissions of volatile and semi-volatile (vapor pressure between 10^{-4} and 10^{-11} atmospheres at STP) compounds. In addition, particulate matter and particulate borne emissions of organics and metals should be estimated.

4. An analysis of potential public exposure, and any other significant receptor exposure, from the emission of non-criteria air pollutants. This analysis should include a discussion of the dispersion model used, its selection and its level of error. In addition to annual average meteorological parameters, monthly average conditions should be reviewed to assess shorter term impacts on proximate receptors. Risk assessment should discuss cancer and non-cancer burden in addition to cancer and non-cancer risk.

5. A description of mitigation measures to minimize emissions. This discussion should include control equipment, process control, and other technical measures to reduce emissions of criteria and non-criteria air pollutants.

   The use of wind breaks, such as trees, at the periphery of the property could be discussed as a long-term, airborne particulate matter mitigation measure.

   The mitigation program should include a description of an onsite and offsite air monitoring plan for criteria and non-criteria pollutants. The plan should outline the use of state-of-the-art sample collection and measurement equipment and the implementation of lowest detection analytical measurement methodologies.

6. A description of similar emission sources proposed in California and the control measures and requirements applicable to these sources.

7. Identification and description of all applicable federal, state, and local air pollution control regulations, and measures to comply with these regulations.

   The State of California's "Capacity Assurance Plan for Hazardous Waste Management", dated October 1989, concluded that: "Landfill projections for 1995 show an excess capacity of over 8.3 million tons. This excess capacity reflects additional future landfill capacity that is (already) permitted for but not yet built. Landfill capacity has historically been met on an 'as needed' basis, with additional cells constructed only as existing cells were nearing capacity. Thus even if landfill utilization occurs at a higher rate than projections indicate, there does appear to be sufficient permitted future landfill capacity to meet projected 1995 utilization demand. Even assuming that no additional capacity is constructed beyond that which is currently permitted, over 100,000 tons of excess landfill capacity will remain in (the year) 2009."

The draft EIR should address the findings of the Capacity Assurance Plan as summarized above, and the Department of Health Services (DHS) should be provided with a copy of the draft EIR for review. The appropriate contact would be Mr. Robin Reynolds, DHS, Toxic Substances Control Program, Alternative Technology Division, 714/744 P Street, P.O. Box 942732, Sacramento, CA 04234-7300.

8. A description of alternatives to the proposed project and associated emissions of these alternatives.

We hope that a thorough discussion of the items listed in this letter will provide a better understanding of the air quality aspects of the proposed project and contribute to an effective EIR process. Thank you for the opportunity to participate in the preparation of this draft EIR. We would appreciate directly receiving a copy of your draft EIR. If you have questions regarding our comments or if we can be of further assistance, please contact Renee Capouya at (916) 327-5622.

Sincerely,

Jim Behrmann, Manager
Toxics Program Support Section

cc: Chuck Fryxell,
San Bernardino County APCD
John Keene, OPR
Robin Reynolds, DHS
Donald J. Ames, ARB
Renee Capouya, ARB

Attachment

Attachment

References

1. Shen T.T. (April, 1982) "Air Quality Assessment for Land Disposal and Industrial Wastes", Environmental Management, Volume 6, No. 4, pp 297-305.

2. Hwang S.T. (May, 1986) "Development of Advisory Levels for Polychlorinated Biphenyls (PCB) Cleanup", EPA/600/6-86/002, Exposure Assessment Group, Office of Health and Environmental Assessment, U.S. EPA.

STATE OF CALIFORNIA GEORGE DEUKMEJIAN, *Governor*

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
LAHONTAN REGION

VICTORVILLE BRANCH OFFICE
15428 CIVIC DRIVE, SUITE 100
VICTORVILLE, CA 92392-2359
(619) 241-6583

February 1, 1990

Mr. Paul Keilhold
San Bernardino County
385 North Arrowhead Avenue
San Bernardino, CA 92415-0182

Dear Mr. Keilhold:

RESPONSE TO NOTICE OF PREPARATION FOR ENVIRONMENTAL IMPACT REPORT (EIR) FOR BROADWELL DRY LAKE HAZARDOUS WASTE REPOSITORY, LUDLOW, SAN BERNARDINO COUNTY

We have received your notice of preparation of an EIR for the above facility. The following concerns should be addressed to determine water quality impacts and necessary mitigation measures from this project:

1. SITE GEOLOGY

   The proponent must make a detailed and exhaustive study of the regional geology surrounding the site. Under this site there are indications of surficial parallel fissures. Section 2531, Title 23, Cal. Code of Regs. (Subchapter 15) specifies minimum siting criteria for class I Hazardous Waste Management Units. The project proponent must demonstrate that the project will meet the minimum siting criteria. The cause of the surficial fissures must be identified. The proximity of any faults to the proposed site and the size and age of the faults must be established. We recommend a complete seismic survey be performed at the site.

2. SITE HYDROLOGY

   The surface and ground water hydrology of the Broadwell Dry Lake Basin must be established. The depth and extent of the lakebed clays and surrounding alluvium must be determined as well as ground water elevations and contours, in situ underlying permeabilities, the existence of past or present artesian conditions at the alluvium/lakebed interface, and water quality both hydraulically up and down gradient of the site. A thorough analysis of proposed mitigation measures to protect the site from inundation and washover and protect ground water from leachate should be made.

3. FACILITY DESIGN

Construction methods that will meet the criteria of Subchapter 15 for a Class 1 hazardous waste disposal sites are required. These are minimum criteria only. The Regional Board may require additional measures to protect water quality. Vadose and ground water monitoring must meet the criteria of Subchapter 15.

4. REGULATORY COMPLIANCE

The EIR should discuss how the proposed project will comply with County, State and Federal regulations. Of particular concern to the Regional Board is compliance with criteria contained in Subchapter 15, Chapter 3, Title 23, Cal. Code of Regs., including Article 9 of Subchapter 15.

5. TRANSPORTATION

The EIR should discuss mitigation measures that will be implemented to prevent potential water quality impacts from occurring as a result of spills of the waste material. A spill contingency plan should be developed which would address containment, collection and disposal of material that may be spilled on site during handling. Containment of any hazardous substances, such as fuels and motor oils used in site operations, should meet county and state requirements.

6. DOMESTIC SEWAGE

Domestic sewage would probably be disposed by on-site septic systems. The EIR should discuss measures that will be employed to insure that only domestic sewage goes to the disposal system.

7. WASTE CHARACTERIZATION

The EIR should discuss the types of waste which will be accepted, the compatibility of the various types of wastes which will be accepted, and methods to segregate incompatible wastes.

8. OPERATIONS

The EIR should discuss in detail the proposed storage methods, where leachate would collect, contingency plans for addressing failures of the handling or containment systems, procedures for notification of responsible agencies if a failure or leak should occur, and a description of the regular inspection and maintenance program, load checking program and waste sampling program.

9. LONG TERM USE

The EIR should discuss the long term use of the site. This should include recycling and volume reduction potential, cell and site closure plans, and post-closure maintenance that would provide for termination of operations in a manner that will protect surface and ground water quality. The cost of implementing the closure and post-closure must be determined and financial assurances that adequate monies would be available at closure must be demonstrated.

If you have any questions please call Jehiel Cass or Michael B. Wochnick at (619) 241-6583.

Sincerely,

Harold J. Singer
Executive Officer

cc: Tom Dodson, Broadwell Corporation, Los Angeles County
State Clearinghouse

JC/bj

LAND MANAGEMENT DEPARTMENT

385 North Arrowhead Avenue • San Bernardino, CA 92415-0180 • (714) 387-4091

COUNTY OF SAN BERNARDINO
ENVIRONMENTAL
PUBLIC WORKS AGENCY

JOHN N. JAQUESS
Land Management Director

OFFICE OF PLANNING
Sharon W. Hightower
County Planning Officer

OFFICE OF SURVEYOR
Claude D. Tomlinson, L.S.
County Surveyor

OFFICE OF BUILDING AND SAFET
Larry L. Schoelkopf, P.E.
County Building Official

COMMENTS AND CONCERNS REGARDING
THE BROADWELL CORP. PROPOSED
HAZARDOUS WASTE RESIDUAL REPOSITORY

DATE:

NAME:

ADDRESS:

AFFILIATION:

****

Please use this form to submit written comments on the proposed project. Indicate what information you believe should be included or analyzed in the Environmental Impact Report.

Please mail to Paul Kielhold, Environmental Analyst, Office of Planning; 385 N. Arrowhead Avenue; San Bernardino CA 92415-0182.

****

COMMENTS:

A STATE BUREAU OF MINES AND GEOLOGY REPORT SUGGESTS THAT THERE IS UNDERGROUND WATER [illegible] BEGINNING NEAR [illegible] THROUGH DRY LAKES TERMINATING AT THE COLORADO RIVER —

EXACT TITLE & AUTHOR - UNKNOWN AT MEETING TIME - I CAN SUPPLY COPY

2573803

BROADWELL.COM

Circa 1954
Pleistocene lakes of Mojave

LAND MANAGEMENT DEPARTMENT

385 North Arrowhead Avenue • San Bernardino, CA 92415-0180 • (714) 387-4091

COUNTY OF SAN BERNARDINO
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County Surveyor

OFFICE OF BUILDING AND SAFETY
Larry L. Schoelkopf, P.E.
County Building Official

'89 NOV 27 P[illegible]

COMMENTS AND CONCERNS REGARDING
THE BROADWELL CORP. PROPOSED
HAZARDOUS WASTE RESIDUAL REPOSITORY

DATE: November 24, 1989

NAME: Dr. Diane L. Mitchell Diane L. Mitchell

ADDRESS:
1732 Country Club Dr.
Bakersfield, CA 93306

AFFILIATION: (independent biological consultant)

****

Please use this form to submit written comments on the proposed project. Indicate what information you believe should be included or analyzed in the Environmental Impact Report.

Please mail to Paul Kielhold, Environmental Analyst, Office of Planning; 385 N. Arrowhead Avenue; San Bernardino CA 92415-0182.

****

COMMENTS: There may be desert bighorn sheep migration corridors immediately north of Broadwell Lake, which connect the Cady Mountains and the Bristol Mountains. Also, according to Dr. John Wehausen, bighorn sheep researcher, reintroduction of desert bighorn sheep to the Bristol Mountains is a high priority of California Department of Fish and Game. The Cady Mountains herd is being studied at present.

LAND MANAGEMENT DEPARTMENT

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COUNTY OF SAN BERNARDINO
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Larry L. Schoelkopf, P.E.
County Building Official

COMMENTS AND CONCERNS REGARDING
THE BROADWELL CORP. PROPOSED
HAZARDOUS WASTE RESIDUAL REPOSITORY

DATE:

NAME: Evelyn Engle

ADDRESS: 33546 Fremont Rd.
Newberry Springs CA 92365

AFFILIATION:

****

Please use this form to submit written comments on the proposed project. Indicate what information you believe should be included or analyzed in the Environmental Impact Report.

Please mail to [redacted]vironmental Analyst, Office of Planning; 385 N. Arrowhead Avenue; San Bernardino CA 92415-0182.

****

COMMENTS:

If the Broadwell Corp is approved,then hazardous waste opens the door for other waste sites too. Such as Hidden Valley closer to Newberry Springs.

Since the value of our properties will be lower. Does the county downgrade our taxes?

If Broadwell Corp goes bankrup, how will the hazardous waste be maintained ?

If our ground water is contaminated. How do they plan to get good water to everyone? How can they be responsible for there action?

'89 NOV AM 9:44

BROADWELL.COM

LAND MANAGEMENT DEPARTMENT

385 North Arrowhead Avenue • San Bernardino, CA 92415-0180 • (714) 387-4091

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OFFICE OF BUILDING AND SAFE
Larry L. Schoelkopf, P.E.
County Building Official

COMMENTS AND CONCERNS REGARDING
THE BROADWELL CORP. PROPOSED
HAZARDOUS WASTE RESIDUAL REPOSITORY

DATE: December 14, 1989

NAME: L. Thomas Bayne

ADDRESS: 6504 Bridgeport Lane, Bakersfield, California 93309

AFFILIATION: None

****

Please use this form to submit written comments on the proposed project. Indicate what information you believe should be included or analyzed in the Environmental Impact Report.

Please mail to Paul Kielhold, Environmental Analyst, Office of Planning; 385 N. Arrowhead Avenue; San Bernardino CA 92415-0182.

****

COMMENTS:

See Attached Letter.

89 DEC 1[illegible] [illegible]:52

BROADWELL.COM

L. Thomas Bayne
6504 Bridgeport Lane
Bakersfield, California 93309

Subject: Comments and Concerns Regarding the Broadwell Corp. Proposed Hazardous Waste Residual Repository

Gentlemen:

The Environmental Impact Report needs to evaluate the following potential significant impacts and present mitigation measures for the identified impacts.

NATURAL HAZARDS

1. Geologic Hazard. Will the proposed project result in significant impacts related to:
    (a). unstable earth condition or changes in geological substructures?

COMMENTS & CONCERNS

1. Soil conditions (presence of soil borne salts, swelling and shrinking clays, and plastic silts) where differential settling, subsidence, or liquefaction may result in structural failure.

2. Geologic features (solution cavities) that may result in sudden or non-sudden structural failure.

3. Project related features or events (areas of extensive excavation or groundwater withdrawal) that may result in sudden or non-sudden structural failure.

4. Susceptibility to substantial mass movement of playa surface as has occurred on Rogers Dry Lake Bed.

5. Classification of stratified playa soils from the surface to the groundwater
    (a). physical properties
    (b). engineering properties
    (c). profile plan view delineating continuity of stratified soils across the project
    (d). percentage of clay in each strata

6. Horizontal and vertical insitu primary and secondary permeability at pressures comparable to the standing water of a 100 year storm event on the floodplain over the stratified soil conditions.

7. Variations of the physical characteristics and properties of the soil strata with differential moisture contents.

8. Variations of the physical characteristics and properties of the soil strata with pH variations and chemical contacts.

9. The potential for increased percolation of storm runoff as relates to groundwater recharge and migration in the areas to be excavated for clays and aggregates.

10. An analysis and determination of the origin extent, soil classification, soil properties and causes of the large playa fissures fractures segmenting the Broadwell playa.

11. Anticipated sudden and/or non-sudden settlement from the projected loading of the waste pile on the surface and underlying playa soils with possible changed moisture conditions.

Respectfully Submitted

J Thomas Bayne

LAND MANAGEMENT DEPARTMENT

385 North Arrowhead Avenue • San Bernardino, CA 92415-0180 • (714) 387-4091

COUNTY OF SAN BERNARDINO
ENVIRONMENTAL
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County Surveyor

OFFICE OF BUILDING AND SAFETY
Larry L. Schoelkopf, P.E.
County Building Official

COMMENTS AND CONCERNS REGARDING

THE BROADWELL CORP. PROPOSED

HAZARDOUS WASTE RESIDUAL REPOSITORY

DATE: 12-13-89

NAME: Sue Hickman

ADDRESS: P.O. Box 36, Yermo, CA 92398

AFFILIATION: None

****

Please use this form to submit written comments on the proposed project. Indicate what information you believe should be included or analyzed in the Environmental Impact Report.

Please mail to Paul Kielhold, Environmental Analyst, Office of Planning; 385 N. Arrowhead Avenue; San Bernardino CA 92415-0182.

****

COMMENTS:

See Attached:

89 DEC 14 AM 10:13

COMMENTS AND CONCERNS REGARDING
THE BROADWELL CORP. PROPOSED
HAZARDOUS WASTE RESIDUAL REPOSITORY

DATE: December 13, 1989

NAME: Sue Hickman

ADDRESS: P.O. Box 36
Yermo, CA. 92398

AFFILIATION: None

I am concerned with the following aspects of this project and believe they should be included or analyzed in the Environmental Impact Report.

CONTINUED ACCESS ON CRUCERO ROAD. As a rockhound, the Cady mountain area, is a prime rockhounding location. Now that access to the Cady's has been limited by the Afton Canyon Management Plan implementation, Crucero Rd. becomes the prime access route to rockhounding in this area. I would like assurance that the entire length of Crucero Rd. will remain open to public access.

OLD T & T BERM ACROSS BROADWELL LAKE. The Friends of the Mojave Road are in the process of completing their "Heritage Trail" project, which is a 600+ mile 4WD loop through the East Mojave Scenic Area. Part of the 3rd Segment of the Heritage Trail follows the T & T berm across Broadwell Lake to Ludlow. I would like assurance that this 4WD recreational vehicle trail will remain open to public access.

HEAT IMPLICATIONS ON MATERIAL STORED. Summer temperatures in this area can, and often, reach 120 degrees. I would like to know if this will cause any adverse reaction on the materials stored.

HAZARDOUS/RADIOACTIVE MATERIALS & AIR QUALITY. When the material to be stored is worked by the equipment, what will be done to reduce excessive dust. What will be done about the hazardous material that becomes fragmented and may contaminate the surrounding area. What will be done to contain the hazardous waste during a severe dust storm or the phenomena "Dust Devils"?

SUMMARY OF OPERATIONS ITEM #4. The operation plan calls for covering the hazardous material with additional compatible waste. What exactly will constitute compatible waste? Will this compatible waste be hauled to this site from another area? Is there a plan of operation for this compatible waste?

REVEGETATION. What will be done to revegetate or recontour the borrow sites?

COMMENTS AND CONCERNS REGARDING
THE BROADWELL CORP. PROPOSED
HAZARDOUS WASTE RESIDUAL REPOSITORY

DATE: December 13, 1989

NAME: Sue Hickman

FUTURE IMPLICATIONS. If hazardous material remains at this site for more than 50 years, what is the environmental impact at that time. If this hazardous material is never reclaimable, what will be done with the material? With the site? Is the Bond for this site adequate for the protection of future generations?

LAND MANAGEMENT DEPARTMENT

385 North Arrowhead Avenue • San Bernardino, CA 92415-0180 • (714) 387-4091

COUNTY OF SAN BERNARDINO
ENVIRONMENTAL
PUBLIC WORKS AGENCY

JOHN N. JAQUESS
Land Management Director

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OFFICE OF BUILDING AND SAFETY
Larry L. Schoelkopf, P.E.
County Building Official

COMMENTS AND CONCERNS REGARDING
THE BROADWELL CORP. PROPOSED
HAZARDOUS WASTE RESIDUAL REPOSITORY

89 DEC 12 AM 10:01

DATE: December 4, 1989

NAME: W. R. Moyle, Jr.

ADDRESS: 5091 Canterbury Drive
Cypress, California 90630

AFFILIATION: Geologist

****

Please use this form to submit written comments on the proposed project. Indicate what information you believe should be included or analyzed in the Environmental Impact Report.

Please mail to Paul Kielhold, Environmental Analyst, Office of Planning; 385 N. Arrowhead Avenue; San Bernardino CA 92415-0182.

****

COMMENTS:

Page 1. The only man made disturbance on Broadwell playa is a dirt trail.

There are several other man made features on Broadwell playa. These include: the abandoned railroad station site at Broadwell, the Tonapah and Tidewater railroad bed (tracks removed), the sand and gravel pit used for construction materials located in T9N, R7E, Section 13, West 1/2 of Northeast 1/4, and the several wells drilled on the playa. Broadwell was also used by General Patton during WW II and some remnants remain from his use.

Page 2. The repository will be located on a clay lake bed.

U.S. Air Force studies of playas show that Broadwell playa contains 38.3% clay, 59.8% silt to coarse sand, and 1.9% soluble salts.

Page 4. Natural clays exceed 10^{-7} centimeters/second.

According to U.S. Air Force data the playa is composed of 38.3% clay; therefore, the sediments are probably more permeable than 1×10^{-7} cm/s.

Page 5. Wind erosion

High winds that occur when the playa contains flood waters can produce erosion on structures such as an earthen residual repository. Wind driven waves can produce much more erosion than standing water.

Page 11. No data on ground-water resources.

Water-level measurements in two wells at Broadwell show the depth to water below land surface is 65 and 115 feet. Does this meet the minimum requirement?

Water quality data indicates the water beneath Broadwell is brackish or saline. Will this high salt content cause problems when used in the construction phases of the project? The sediments already contain 1.9% salt.

The well water supply for Ludlow is west of Ludlow and west of the Ludlow fault. These wells are shallow and have water temperatures above 100°F. These above-normal water temperatures should be reviewed as there may be geothermal potential in the area.

Page 13. Use local clay to construct repository.

Playa surface is 38.3% clay according to U.S. Air Force data. If local playa soils are to be used in construction of the repository, they will not met the permeability requirements.

Pages 15 and 16. Domestic liquid waste will not be discussed in EIR.

Sewage disposal should be discussed in the EIR since it may affect the moisture content of the soils beneath the residual repository.

Page 18. Scrap hole 3-feet deep on Broadwell dry lake to obtain 3-million cubic yards of clay.

A 3-foot hole will make a major change in the surface-water storage area on the playa. It will decrease the evaporation rate due to a smaller water-surface area and increase the ground-water recharge to the shallow sediments. This may affect the sediments under the repository since most sediments have higher horizontal permeabilities than vertical.

Since the U.S. Air Force data shows the playa sediments to be 38.3% clay, it may take a 9-foot hole over the same surface area to obtain the 3-million cubic yards of 100% clay. This would also require some sort of plant to sort the sediments. Clay size particles range in size between 1-5 microns. Separation of these fine sediments may cause a dust problem and should be addressed in the EIR.

Broadwell Summary (2-unnumbered pages) Broadwell Corp. expects typical moisture content to be 50%.

Is this 50% content measured by weight or volume? 50% moisture by weight or volume seems extremely high.

GREENPEACE
PACIFIC SOUTHWEST OFFICE
FORT MASON, LANDMARK BUILDING E
SAN FRANCISCO, CA 94123
(415) 474-6767 • TELEX 340275

90 JAN -5 PM 3:31

3 January, 1990

Freedom of Information Act Officer
[redacted]
385 N. Arrowhead Ave
San Bernadino, CA 92415

RE: Freedom of Information Act Request- Broadwell Basin Residuals Repository, San Bernadino County.

Dear Madam or Sir:

Under the provisions of the Freedom of Information Act, 5 U.S.C. Section 552, I am requesting access to review all information in the possession of you and/or your staff regarding the Broadwell Residuals Repository site, located in San Bernadino County, California. This information should include, but not be limited to all inspections, notes, reports, maps, phone conversation notes, monitoring data, laboratory reports, memoranda, correspondence, computer data, and so forth that refer to the above-mentioned facility, for the time period of 1 January to 11 December, 1989 inclusive.

If there are any fees for searching for or copying the records I have requested, please inform me before you fill this request.

If all or any part of this request is denied, please cite the specific exemption(s) which you think justifies your refusal to release the information and inform me of the appeal procedures available to me under the law.

I would appreciate your handling of this request as quickly as possible. I look forward to hearing from you within ten (10) days as the law stipulates.

Sincerely,

Margie Kelly

Margie Kelly
Toxics Campaign

GODDARD & GODDARD ENGINEERING

– ENVIRONMENTAL STUDIES –

Wilson B. Goddard, Ph.D.
Chief Research Engineer

Christine B. Goddard, M.A.
Manager, Environmental Planner

6870 Frontage Road, Lucerne, CA 95458-8504
(707) 274-2171 Voice & FAX

[redacted]
Environmental Analyst
Office of Planning
385 N. Arrowhead Ave.
San Bernardino, CA 92415-0182

RE: COMMENTS AND CONCERNS REGARDING THE BROADWELL CORPORATION PROPOSED HAZARDOUS WASTE RESIDUAL REPOSITORY

November 13, 1989

89 NOV 20 [illegible]:22

Dear Mr. Kielhold:

Enclosed are comments and concerns regarding The Broadwell Corporation Proposed Hazardous Waste Residual Repository that we would like addressed in the Environmental Impact Report. We have had the opportunity to study the Broadwell Dry Lake area and have enclosed our major concerns.

We would like the analysis to include studies concerning the sensitivity of dry lake playa areas in particular the Broadwell Dry Lake regarding flooding and liquefaction and wind/water erosion potential. We would like the air quality impact analysis to quantify and mitigate air toxics, criteria and noncriteria emissions during construction and operation of a land fill type final hazardous waste repository. With the open land fill nature of the proposed project, an in-depth health risk assessment should be included for employees and public sensitive receptors.

The California Department of Health Services and the Air Resources Board, following the Tanner AB 2948 mandates, have set stringent requirements for final residuals repositories in an effort to move away from the environmental problems associated with storage of toxic wastes at "land fills". Unfortunately, the Broadwell Corporation proposal appears to be an attempt to use old "land fill" technologies to meet new AB 2948 requirements.

Sincerely,

Wilson B. Goddard, Ph.D.
Principal

COMMENTS AND CONCERNS REGARDING THE BROADWELL CORPORATION PROPOSED HAZARDOUS WASTE RESIDUAL REPOSITORY

DATE: November 13, 1989

NAME: Wilson B. Goddard, Ph.D., Principal

ADDRESS: GODDARD & GODDARD ENGINEERING - ENVIRONMENTAL STUDIES
6870 Frontage Road, Lucerne, CA 95458-8504
(707) 274-2171 Voice & FAX

AFFILIATION: Principal and Chief Research Engineer, GODDARD & GODDARD ENGINEERING - ENVIRONMENTAL STUDIES

NATURAL HAZARDS

1. **Geological Hazards** Will the proposed project result in significant impacts related to:

   a. Unstable earth conditions or changes in geological substructures?

2. **Flood Hazards** Will the proposed project result in significant impacts related to: (all factors)

   Comment

   The precipitation patterns in the Mojave Desert are influenced by periodic severe summer thunder storms and by southern hurricanes moving through the area (CDWR, 1969, NOTS, 1962). The water shed area of Broadwell Lake (water basin 6-33) contains 156,000 acres (244 sq mi) and has a considerable flood potential especially near the dry lake and playa areas (Initial Study, CDFG, 1977).

   Subjects to be Addressed in the EIR Analysis

   Study the potential for the Broadwell Dry Lake and the Broadwell facilities to be inundated by periodic summer thunder storms or by southern hurricanes causing liquefaction effects on land fill repositories and facilities' foundations.

   The EIR analysis should include a detailed study of the precipitation run-off in the Broadwell Dry Lake water shed (water basin 6-33). Broadwell Lake flood estimates from severe storm run-off should be included. What would be the effects of the potential flooding on the project access road, the hazardous waste open air compaction activity and run-off contamination by compacting hazardous wastes?

NATURAL HAZARDS

4. Wind/Erosion. Will the proposed project result in significant impacts related to:

   a. Any increase in wind or water erosion of soils, either on or off the site?

   Comments

   Mojave desert dry lakes and playas are areas were clay silts have been carried and deposited by rain and wind action. These areas are subject to severe wind and water erosion when disturbed during construction or operational activities (EPA, 1977). Playa and dry lake or desiccated lakes such as Owens Lake represent the largest small particulate (PM10) emissions sources in the United States (Reinking, 1975).

   Subjects to be Addressed in the EIR Analysis

   The EIR analysis should include a study of the silt content of the Broadwell Dry Lake project area and access road. Disturbed areas affected by construction and operation should be evaluated for increased fugitive dust emissions caused by the wind action on disturbed areas. The evaluation should take into consideration that the area is nonattainment for PM10.

NATURAL RESOURCES

10. Air Quality. Will the proposed project result in significant impacts related to:

    a. Substantial air emissions or deterioration of ambient air quality?

    Comments

    The soils in the Broadwell Dry Lake Basin contain high percentages of clay silts which could result in high fugitive dust emissions during construction and operation of the proposed facility (Reinking, 1975; Rockwell, 1980; EPA, 1977).

    The proposed open hazardous waste handling, filling and compacting could produce substantial toxic gaseous and particulate emissions (Summary of Broadwell Basin Residual Repository/Landfill Facility Operations).

    Subjects to be Addressed in the EIR Analysis

    Potential air pollutant emissions should be quantified and mitigation measures developed for all construction and operation activities. Emission sources covered should include fugitive dust of disturbed desert playa areas, construction equipment exhausts, and hazardous waste emissions from open operations of filling, compacting and repository pod covering.

An air quality impact study with modeling should be conducted using the developed gaseous and particulate emissions inventory of criteria, noncriteria and toxics. The analysis should include the incremental and cumulative impacts. Sections should include the following:

- o The analysis of the project air quality impact should make use of all available meteorological data, air quality monitoring data and topographic data for the area.
- o Past and present ambient air quality should be studied so that trends and cumulative impacts can be estimated for selected sensitive receptors.
- o The air quality, meteorological and topographic data should be utilized in the estimation, assisted by modeling, of local winds and the area's air dispersion characteristics. The results of the analysis should quantify local pollutant trajectories and dispersion characterization.
- o Air quality impact of project-related emissions should be estimated through modeling of plume rise and pollutant dispersion along the estimated wind transport paths using models requested by the SBCAPCD consistent with the requirements of the Southeast Desert Air Basin Rules and Regulations. The results should be presented in tabular form and as isopleths of estimated ground level concentrations, above ambient for air pollutants of concern.
- o The study should contain an in-depth health risk assessment section covering project air toxics derived from characterized residual hazardous wastes.
- o A comprehensive discussion of suggested mitigative measures should include the following topics and complete abatement of the following impacts:
    1. Fugitive dust and toxic particulate and gaseous emissions during civil construction, road traffic and all operational activities of handling, filling, compacting and covering of hazardous toxic wastes.
    2. Maintaining criteria air pollutant daily construction and operating emissions below 250 lb/day and elimination of all toxic emissions.

3. Selection of project facilities equipment which have the potential to emit air emissions based upon use of the Lowest Achievable Emission Rate (LAER) and BACT.

4. Project work areas and roads should be kept in a clean condition to avoid fugitive dust and toxic particulate carry-on.

5. Impacts from construction and operating employee commute traffic.

6. Mitigation measures for toxic gaseous and particulate emissions during transit, handling, compacting and covering should be analyzed for their compatibility with and non-contamination of the residual treated hazardous wastes. For example, in the proposed "open land fill" type of operation, dust palliatives will readily mix with and contaminate the treated residuals.

REFERENCES

CDFG, 1977
San Bernardino County Water Basin Map, Statewide Pesticide Use Plan & Environmental Impact Report County Components, California Department of Food and Agriculture, Sacramento, CA

CDWR, 1969
Water Conditions in California, Report No. 3, California Department of Water Resources, Bulletin No. 120-69, 15p

EPA, 1977
Guideline for Development of Control Strategies in Areas with Fugitive Dust Problems, EPA-450/2-77-029 October 1977, Research Triangle Park, North Carolina 27711

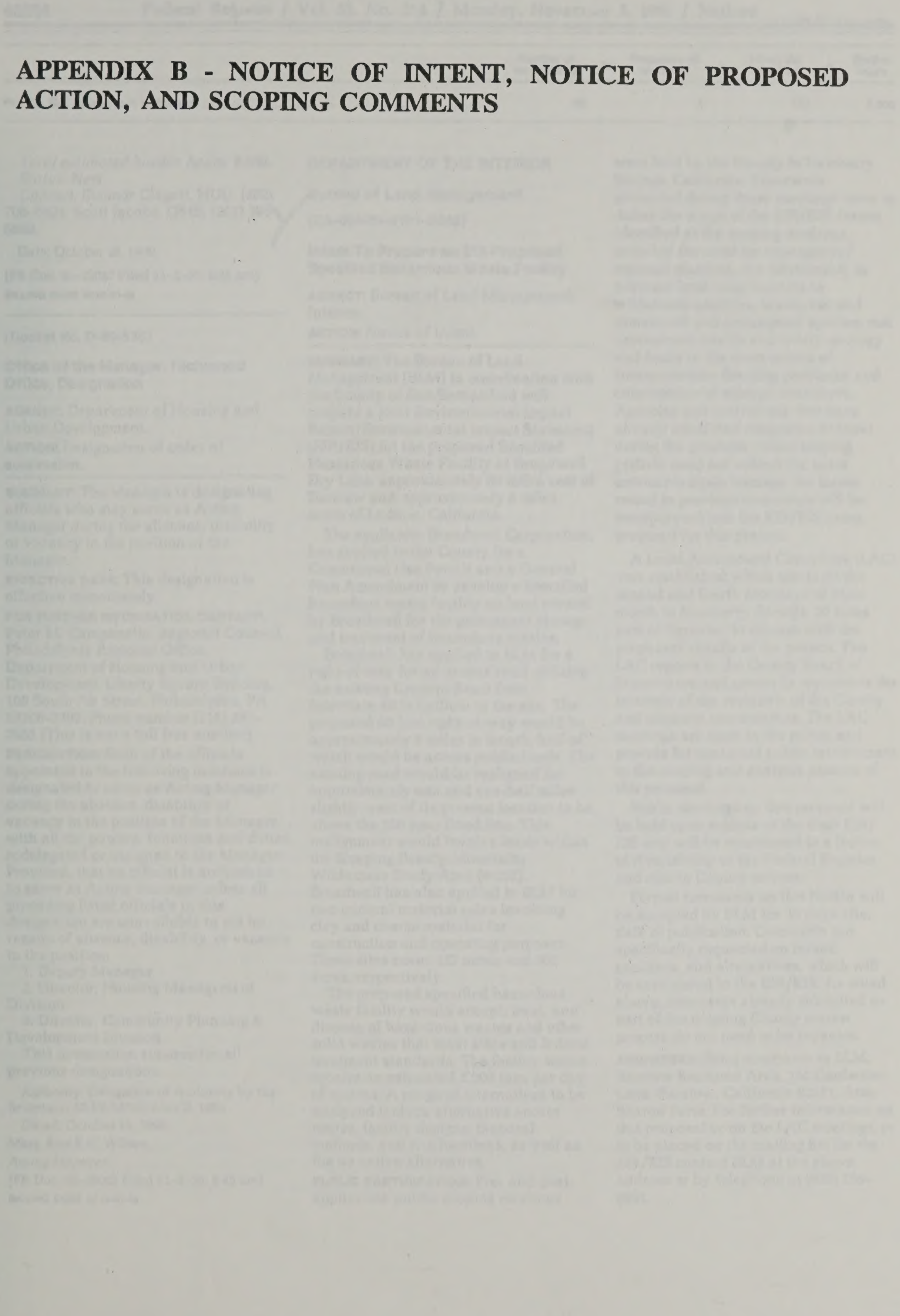
NOTS, 1962
A Climatological Summary of the Surface and Upper Air Weather at NOTS, 1946-1962, U.S. Naval Ordnance Test Station, China Lake, CA.

Reinking, R.F., L.A. Mathews and P. St.-Amand, 1975
Dust Storms Due to the Desiccation of Owens Lake, Earth & Planetary Sciences Division, Research Department, Naval Weapons Center, China Lake, CA. International Conference on Environmental Sensing and Assessment, Sept. 14-19, 1975, Los Vegas, Nev., IEEE publishers.

Rockwell International, 1980
Air Quality Technical Report on the Coso Geothermal Study Area. U.S. Dept. of Interior, BLM, Newbury Park, California.

APPENDIX B

APPENDIX B - NOTICE OF INTENT, NOTICE OF PROPOSED ACTION, AND SCOPING COMMENTS



	Number of respondents	×	Frequency of response	×	Hours per response	=	Burden hours
PHACA Self-Assessment Instrument	80		1		120		9,600

Total estimated burden hours: 9,600.

Status: New.

Contact: Eleanor Clagett, HUD, (202) 708-0404; Scott Jacobs, OMB, (202) 395-6880.

Date: October 26, 1990.

[FR Doc. 90-26067 Filed 11-2-90; 8:45 am]

BILLING CODE 4210-01-M

[Docket No. D-90-935]

Office of the Manager, Richmond Office, Designation

AGENCY: Department of Housing and Urban Development.

ACTION: Designation of order of succession.

SUMMARY: The Manager is designating officials who may serve as Acting Manager during the absence, disability or vacancy in the position of the Manager.

EFFECTIVE DATE: This designation is effective immediately.

FOR FURTHER INFORMATION CONTACT: Peter M. Campanella, Regional Counsel, Philadelphia Regional Office, Department of Housing and Urban Development, Liberty Square Building, 105 South 7th Street, Philadelphia, PA 19106-3392. Phone number (215) 597-2655 (This is not a toll free number).

DESIGNATION: Each of the officials appointed to the following positions is designated to serve as Acting Manager during the absence, disability or vacancy in the position of the Manager, with all the powers, functions and duties redelegated or assigned to the Manager: Provided, that no official is authorized to serve as Acting Manager unless all preceding listed officials in this designation are unavailable to act by reason of absence, disability, or vacancy in the position:

1. Deputy Manager
2. Director, Housing Management Division
3. Director, Community Planning & Development Division

This designation supersedes all previous designations.

Authority: Delegation of Authority by the Secretary, 50 FR 18742, May 2, 1985.

Dated: October 15, 1990.

Mary Ann E.G. Wilson,

Acting Manager.

[FR Doc. 90-26065 Filed 11-2-90; 8:45 am]

BILLING CODE 4210-01-M

DEPARTMENT OF THE INTERIOR

Bureau of Land Management

[CA-060-01-5101-B002]

Intent To Prepare an EIS Proposed Specified Hazardous Waste Facility

AGENCY: Bureau of Land Management, Interior.

ACTION: Notice of intent.

SUMMARY: The Bureau of Land Management (BLM) in coordination with the County of San Bernardino will prepare a joint Environmental Impact Report/Environmental Impact Statement (EIR/EIS) fot the proposed Specified Hazardous Waste Facility at Broadwell Dry Lake, approximately 60 miles east of Barstow and approximately 8 miles north of Ludlow, California.

The applicant, Broadwell Corporation, has applied to the County for a Conditional Use Permit and a General Plan Amendment to develop a specified hazardous waste facility on land owned by Broadwell for the permanent storage and treatment of hazardous wastes.

Broadwell has applied to BLM for a right-of-way for an access road utilizing the existing Crucero Road from Interstate 40 in Ludlow to the site. The proposed 60 foot right-of-way would be approximately 8 miles in length, half of which would be across public lands. The existing road would be realigned for approximately one and one-half miles slightly west of its present location to be above the 100 year flood line. This realignment would involve lands within the Sleeping Beauty Mountains Wilderness Study Area (#252). Broadwell has also applied to BLM for two mineral material sales involving clay and coarse material for construction and operating purposes. These sites cover 227 acres and 363 acres, respectively.

The proposed specified hazardous waste facility would accept, treat, and dispose of hazardous wastes and other solid wastes that meet state and federal treatment standards. The facility would receive an estimated 2,000 tons per day of wastes. A range of alternatives to be analyzed include alternative access routes, facility designs, disposal methods, and site locations, as well as the no action alternative.

PUBLIC PARTICIPATION: Pre- and post-application public scoping meetings were held by the County in Newberry Springs, California. Comments presented during these meetings serve to define the scope of the EIR/EIS. Issues identified at the scoping meetings included the need for interagency/regional planning, the relationship to adjacent land uses; impacts to wilderness qualities, water, air, and threatened and endangered species; risk assessment; health and safety; geology and faults in the area; means of transportation; flooding problems; and construction of storage containers. Agencies and individuals that have already submitted comments or input during the previous public scoping periods need not submit the same comments again because the issues raised in previous comments will be incorporated into the EIR/EIS being prepared for this project.

A Local Assessment Committee (LAC) was established which meets on the second and fourth Mondays of each month in Newberry Springs, 20 miles east of Barstow, to discuss with the proponent details of the project. The LAC reports to the County Board of Supervisors and generally represents the interests of the residents of the County and adjacent communities. The LAC meetings are open to the public and provide for continual public involvement in the scoping and analysis process of this proposal.

Public meetings on this proposal will be held upon release of the draft EIR/EIS and will be announced in a Notice of Availability in the Federal Register and also in County notices.

Formal comments on this Notice will be accepted by BLM for 30 days after date of publication. Comments are specifically requested on issues, concerns, and alternatives, which will be considered in the EIR/EIS. As noted above, comments already submitted as part of the ongoing County review process do not need to be repeated.

ADDRESSES: Send comments to BLM, Barstow Resource Area, 150 Coolwater Lane, Barstow, California 92311, Attn: Sharon Paris. For further information on this proposal or on the LAC meetings, or to be placed on the mailing list for the EIR/EIS contact BLM at the above address or by telephone at (619) 256-3591.

Dated: October 30, 1990.

Michael J. DeKeyrel,

Acting Area Manager.

[FR Doc. 90–26116 Filed 11–2–90; 8:45 am]

BILLING CODE 4310–40–M

[WO–650–4120–02]

Federal-State Coal Advisory Board: Meeting

AGENCY: Bureau of Land Management, Interior.

ACTION: Notice of meeting.

SUMMARY: This notice is to inform the public that the Federal-State Coal Advisory Board (Board) will meet in Denver, Colorado, December 11, 1990. The public is invited to attend. The Board will (1) Review the status of regional coal activities, (2) discuss the market outlook for coal, and (3) formulate a recommendation on a long-range lease sale plan for Federal coal.

DATES: The Board will meet at 8:30 a.m. on December 11, 1990.

ADDRESSES: The Board meeting will be held at the Registry Hotel, 3203 Quebec Street, Denver, Colorado 80207, telephone (303) 321–3333.

SUPPLEMENTARY INFORMATION: The Board will review the status of coal leasing activities. Regional coal team representatives will present an update of coal leasing activities within their respective regions, including the outlook for lease sales and the current status of preference right lease applications and lease exchanges, where applicable. In addition, Headquarters Bureau of Land Management personnel will present for discussion information on current activities and issues that impact on the coal management program.

The Board will review the long-range outlook for coal markets and its potential impact on the demand for Federal coal. This information will be used to assist the Board in formulating a recommendation on a long-range Departmental lease sale plan at this meeting.

The public will have an opportunity to address the Board on agenda topics during the public comment period noted on the agenda below. Written copies of a speaker's remarks would be appreciated. Any comments will become a part of the record of the Board meeting. The Chairperson may impose a time limit on comments to ensure that everyone wishing to address the Board is able to do so.

Agenda—Federal-State Coal Advisory Board Meeting

December 11, 1990

Denver, Colorado

Welcome and Introductions

- —BLM Director
- —Assistant Director, Energy and Mineral Resources
- —Other Staff
- —Review and Approval of Meeting Agenda
- —Approval of 1989 Meeting Minutes
- —Director's Remarks
- —Regional Coal Team Reports
- —Washington Office Report
- —Long-Range Market Outlook
- —Long-Range Lease Sale Plan
- —Discussion
- —Public Comments
- —Board Recommendation

Adjourn

FOR FURTHER INFORMATION CONTACT: Stan McKee or Dan Wedderburn, Bureau of Land Management (650), MS 3559, 1849 C Street, NW., U.S. Department of the Interior, Washington, DC 20240. Telephone: (202) 208–4636.

Cy Jamison,

Director.

[FR Doc. 90–26105 Filed 11–2–90; 8:45 am]

BILLING CODE 4310–84–M

[WO–250–4370–02]

Wild Horse and Burro Advisory Board; Meeting

AGENCY: Bureau of Land Management, Interior.

ACTION: Notice of meeting of the Wild Horse and Burro Advisory Board.

SUMMARY: Notice is hereby given that the Wild Horse and Burro Advisory Board recently appointed by the Secretary of Agriculture and the Secretary of the Interior will hold their first meeting December 5 to 7, 1990, in Reno, Nevada. The meeting will take place at the Sands Regency Hotel, 345 North Arlington Avenue, from 8 a.m. to 4:30 p.m., except on the afternoon of December 6, when the Board will attend a field tour at the Bureau of Land Management's Palomino Valley Wild Horse and Burro Placement Center, and December 7, when the meeting will adjourn at 3:30 p.m.

DATES: December 5–7, 1990.

ADDRESSES: Director (250), Bureau of Land Management, Premier Building room 901, 1849 C Street, NW., Washington, DC 20240.

FOR FURTHER INFORMATION OR TO SCHEDULE OR SUBMIT TESTIMONY, CONTACT: John S. Boyles, Chief, Division of Wild Horses and Burros, at the above address; telephone (202) 653–9215.

SUPPLEMENTARY INFORMATION: The purpose of the Board, which was chartered in May 1990, is to advise the Secretary of the Interior, the Director, Bureau of Land Management, the Secretary of Agriculture, and the Chief, Forest Service, on matters pertaining to management and protection of wild free-roaming horses and burros on the Nation's public lands.

The meeting will be open to the public. Members of the public may make oral statements to the Board on December 6, 1990, in the morning. Persons wishing to make statements should notify the Bureau of Land Management at the address or telephone number given above by November 21, 1990, so that time can be scheduled for their presentations. Depending on the number of speakers, it may be necessary to limit the length of each presentation. Speakers should address specific wild horse and burro issues and must submit a written copy of their testimony to the address given above or bring a written copy to the meeting. Persons who wish to provide testimony but who are unable to attend the meeting may submit a written statement to the address above.

Members of the public who wish to attend the field trip on December 6 must make their own arrangements for transportation to the Palomino Valley Wild Horse and Burro Placement Center.

The proposed agenda for the meeting is:

Wednesday, December 5: Morning: Introduction of the Board and Agency personnel; review of the Board's charter, Public Law 92–195, as amended, 43 CFR 4700, and wild horse and burro policies.

Afternoon: Briefing/discussion—the land use planning process and the administrative appeals process.

Thursday, December 6: Morning: Briefing on wild horses and burros in Nevada; public comments and issue identification.

Afternoon: Field trip to Palomino Valley Wild Horse and Burro Placement Center to observe preparation and care of captured wild horses and burros.

Friday, December 7: Morning: Fiscal Year 1991 budget briefing; legislative initiative; administrative matters.

Afternoon: Board goals and objectives; plans for next meeting.

Cy Jamison,

Director, Bureau of Land Management.

[FR Doc. 90–26072 Filed 11–2–90; 8:45 am]

BILLING CODE 4310–84–M

NOPA-CA068-91-2
CACA 27365
8500 WSA #252/D
2800(CA-068.21)

NOTICE OF PROPOSED ACTION
LANDS UNDER WILDERNESS REVIEW

NOV 01 1990

STATE-	California
DISTRICT-	California Desert
COUNTY-	San Bernardino
RESOURCE AREA- Attn:	Barstow Area Manager Bureau of Land Management 150 Coolwater Lane Barstow, CA 92311
WSA - NAME: NUMBER:	Sleeping Beauty Mountains CDCA #252

1. Description of Action

The Bureau of Land Management (BLM) in coordination with the County of San Bernardino will prepare an Environmental Impact Report/Environmental Impact Statement (EIR/EIS) for the proposed Specified Hazardous Waste Facility in the Broadwell Lake area approximately 60 miles east of Barstow, California. The involved public lands are described as T. 8 N., R. 8 E., sections 6, 7, 8, 20, and 32; and T. 9 N., R. 8 E., section 31.

2. Description of Activity

The applicant, Broadwell Corporation, has applied to the County for a Conditional Use Permit and a General Plan Amendment to develop a specified waste facility on land owned by Broadwell for the permanent storage and treatment of hazardous wastes. Broadwell has applied to BLM for two mineral materials borrow sites and a right-of-way for an access road from Ludlow and Interstate 40 to the site. The proposed 60 foot right-of-way would be approximately 8 miles in length, half of which would be across public lands. The existing road would be realigned for approximately 1 1/2 miles to a location above the 100 year flood line. This realignment would involve lands within the Sleeping Beauty Mountains Wilderness Study Area.

The facility is designed to receive, treat, and store dry, hazardous waste. The containment and storage areas would consist of above ground storage. It is estimated that the facility would receive and dispose of approximately 2,000 tons of waste material per day.

Pre- and post-application public meetings were held by the County in Newberry Springs, California. Comments presented during these meetings will serve to define the scope of the EIR/EIS. Issues identified at the scoping meetings included the need for interagency/regional planning, the relationship to adjacent land uses, impacts to wilderness qualities, water, air, and threatened and endangered species, risk assessment, health and safety, geology and faults in the area, means of transportation, flooding problems, and construction of storage containers. A range of alternatives to be analyzed in the EIR/EIS include, alternative access routes, facility designs, disposal methods, and site locations, as well as the no action alternative.

A Local Assessment Committee (LAC) was established which meets on the second and forth Mondays of each month in Newberry Springs, 20 miles east of Barstow, to discuss with the proponent details of the project. The LAC reports to the County Board of Supervisors and represents generally, the interests of the residents of the County and adjacent communities. The LAC meetings are open to the public and provide for continual public involvement in the scoping and analysis process of this proposal.

Public meetings on this proposal will be held upon release of the draft EIR/EIS and will be announced in a Notice of Availability in the Federal Register.

4. Chronology of Events

Date	Event
1988/89	Broadwell contacts BLM regarding their pending proposal
11/01/89	Post-application (County) public meeting
08/13/90	Initial project meeting (BLM, County, Broadwell, and contractor)
09/10//90	Memorandum of Understanding signed by BLM, County, and Broadwell outlining how environmental document will be prepared
09/17/90	Right-of-way application received by BLM

5. For Further Information

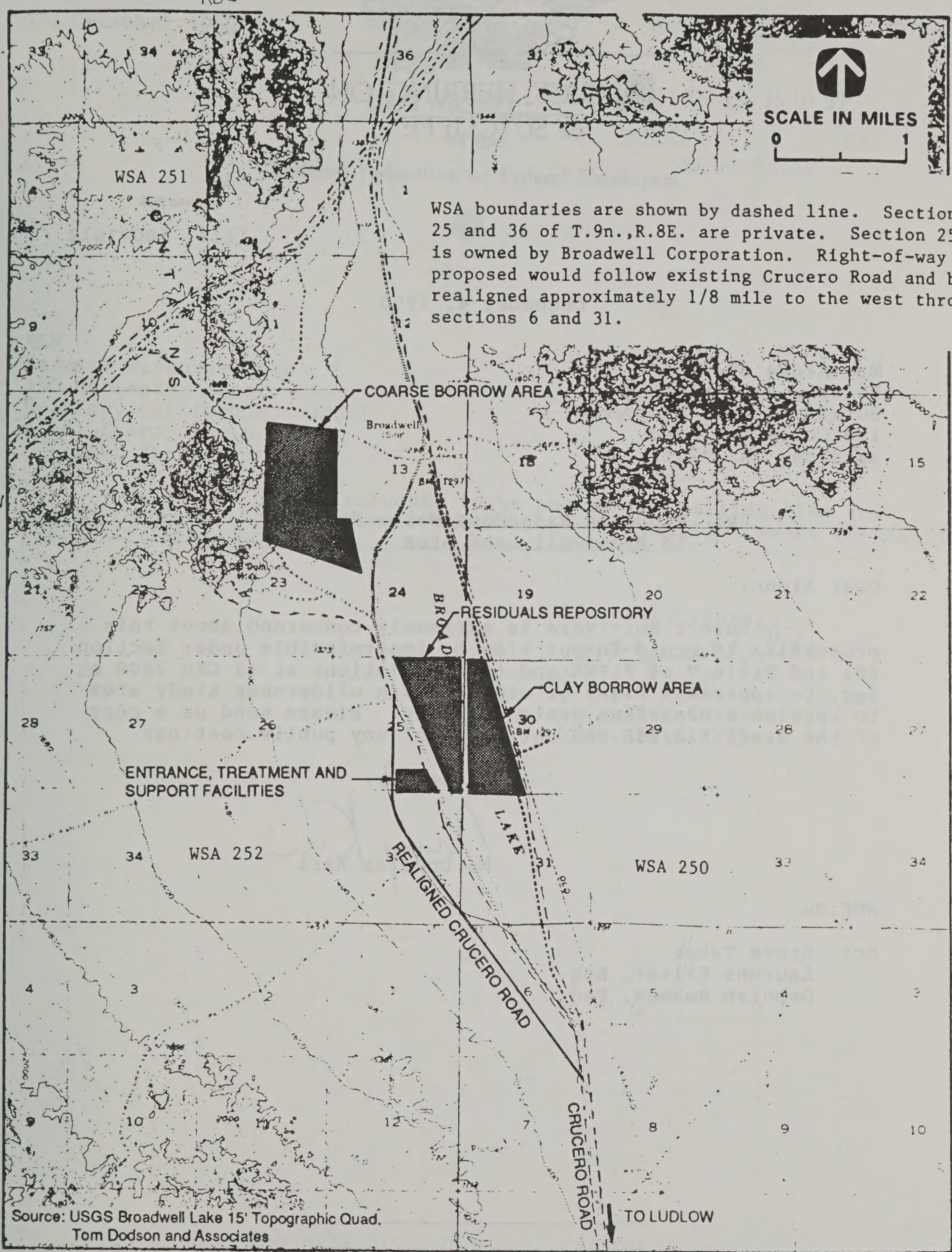
For further information on this proposal, on the LAC meetings, or to be placed on the mailing list for the EIR/EIS contact Sharon Paris, Environmental Coordinator at the address shown above or by telephone at (619) 256-3591.

Karla KB Swanson

Acting Area Manager
Barstow Resource Area

10-31-90

Date



WSA boundaries are shown by dashed line. Sections 25 and 36 of T.9n.,R.8E. are private. Section 25 is owned by Broadwell Corporation. Right-of-way proposed would follow existing Crucero Road and be realigned approximately 1/8 mile to the west through sections 6 and 31.

Source: USGS Broadwell Lake 15' Topographic Quad.
Tom Dodson and Associates

ORRICK, HERRINGTON
& SUTCLIFFE

Direct Dial
(213) 680-7012

December 4, 1990

Mr. Alden Sievers
Barstow Area Manager
Bureau of Land Management
150 Coolwater Lane
Barstow, CA 92311

Re: Proposed Hazardous Waste Facility
in Broadwell Lake Area

Dear Alden:

Desert Survivors is extremely concerned about this proposal. It would in our view be impermissible under Section 601 and Title V of FLPMA and the regulations at 43 CFR 2800 et seq. to approve a right of way across a wilderness study area to service a hazardous waste facility. Please send us a copy of the draft EIR/EIS and notify us of any public meetings.

Sincerely,

Doug Kari

W. Douglas Kari

WDK:de

cc: Steve Tabor
Laurens Silver, Esq.
Deborah Reames, Esq.

333 South Hope Street • Los Angeles, California 90071
Telephone 213 680 7000 • Facsimile 213 680 4600
San Francisco 415 392 1122 • New York 212 326 8800 • Sacramento 916 447 9200

3255k

24 December 1990

Local No. 759

of the

National Federation of Federal Employees

RECEIVED
BUREAU OF
LAND MANAGEMENT

1990 DEC 28 AM 11:59

BARSTOW RESOURCE AREA
BARSTOW, CA

BLM
Barstow Resource Area
150 Coolwater Lane
Barstow, California 92311
Attn: Sharon Paris

Dear Sharon Paris,

Local 759 hereby requests to be put on the mailing list for the Environmental Impact Report/Environmental Impact Statement (EIR/EIS), (CA-060-01-5101-B002).

Sincerely yours,

Joaquin Villa

Joaquin Villa
Secretary-Treasurer,
NFFE, Local 759

2519 Foothill Blvd. Oakland, CA. 94601-1138

DEDICATED TO THE ADVANCEMENT OF THE INTEREST OF THE U. S. GOVERNMENT AND THE GOVERNMENT EMPLOYEE

NRDC 20 YEARS

Natural Resources
Defense Council

90 New Montgomery
San Francisco, CA 94105
415 777-0220
Fax 415 495-5996

November 5, 1990

Sharon Paris
Environmental Coordinator
Bureau of Land Management
150 Coolwater Lane
Barstow, CA 92311

Dear Ms. Paris:

I am writing in response to a recent Notice of Proposed Action: Lands Under Wilderness Review concerning the Sleeping Beauty Mountains, CDCA #252 and the proposed Specific Hazardous Waste Facility in the Broadwell Lake area.

Please forward any additional information regarding this proposal, the LAC meetings, etc. Also, please add the following name and address to your mailing list for the EIR/EIS:

Johanna H. Wald
NRDC
90 New Montgomery, #620
San Francisco, CA 94105

Please note that after December 21, 1990, the new address to be put on your mailing list will be:

Johanna H. Wald
NRDC
71 Stevenson Street, #1825
San Francisco, CA 94105-2938

Thank you for your assistance.

Sincerely,

Hazel Westney

Hazel Westney

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THE WILDERNESS SOCIETY

CALIFORNIA/NEVADA REGIONAL OFFICE

November 28, 1990

Karla Swanson, Acting Area Manager
Barstow Resource Area
Bureau of Land Management
150 Coolwater Lane
Barstow, CA 92311

RE: Environmental Impact Report/Environmental Impact Statement for the proposed Specific Hazardous Waste Facility in the Broadwell Lake area; CDCA 242.

Dear Ms. Swanson:

Thank you for the opportunity to submit scoping comments on the Environmental Impact Report/Environmental Impact Statement (EIR/EIS) for the proposed Specific Hazardous Waste Facility by Broadwell Corporation involving the Sleeping Beauty Mountains Wilderness Study Area (WSA). The Wilderness Society has a long-standing interest in all actions affecting the public resources within the Barstow Resource Area. Our comments and concerns are noted below.

GENERAL COMMENTS:

Possible effects upon the environment must be considered In the evaluation of the Broadwell site. The specific character of the hazardous wastes, the geologic materials at the proposed site and the plausible interaction between the two must be carefully examined.

The EIR needs to consider a full range of alternatives, including the "no-action" alternative, and resulting impacts from each. Each alternative should describe immediate, direct, indirect and long-term impacts to natural resources on federal, private and wilderness study lands in the Broadwell Lake area. In addition, cumulative affects to the affected lands and the involved resources need addressing as well as overall impacts of the project to land uses surrounding the project area.

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Our primary concern regards the proposal to build hazardous waste disposal site access roads through the Sleeping Beauty Mountains WSA. Paved roads are incompatible with the directive and goals which designated wilderness study lands and may be in conflict with the Interim Management Plan Guidelines for lands under wilderness review. Access can be allowed through the WSA "to secure the landowner the reasonable use and enjoyment of non-Federally owned land," but the "reasonable use and enjoyment need not necessarily require the highest degree of access" (IMP Guidelines H-8550-1, Rel. 8-36). The EIR needs to address all policy, including the IMP Guidelines, the California Desert Conservation Plan of 1980 and the Federal Land and Policy Management Act of 1976 (43 U.S.C. 1761-1771) that pertains to the granting of right-of-ways and construction of such roads. In addition, the right-of-way permit requires authorization under the Materials Act (30 U.S.C. 601 et. seq.) and the permittee must pay in advance the fair market value of the mineral or vegetative materials removed for the right-of-way access (43 CFR § 2801).

SPECIFIC COMMENTS:

Wildlife:

The Sleeping Beauty Mountains and encompassing lands are host to a multitude of wildlife species including the federally listed threatened desert tortoise (Gopherus agassizi), the desert bighorn sheep, badgers and the Mojave fringe-toed lizard. The EIR/EIS should include a comprehensive analysis of all flora and fauna involved. The protected desert bighorn sheep, desert tortoise and other species habitats will be greatly reduced from the proposed project and special attention needs to be given to analysis of potential impacts. The EIR/EIS should embody mitigation methods to lessen the impacts to involved wildlife in the project area and in particular the wilderness study lands. Additionally, the environmental impact document needs to consider all possibilities of habitat loss, fragmentation, animal displacement and affects of increased human presence in the Broadwell Lake area.

Air Quality:

Broadwell Dry Lake is a fragile ecosystem with easily disturbed soils. Road building and ground work during construction of the specific hazardous waste facility will create serious air quality problems in the project vicinity through the disturbance of soils and release of dust. The EIR/EIS should encompass pre-, mid-, and post- operations monitoring schedules including monitoring locations and details of equipments to be used. Repeated but not continual degradation of air quality from construction and use of the facility constitutes a threat to local air quality standards. Possible violations and emissions standards need to be explained. Further, the potential for the release of toxic or hazardous emissions, from the hazardous waste facility during its construction and use, exists and needs consideration.

Water Resources:

The water resources affected need complete analysis in the EIR/EIS. All lakes, streams, springs, seeps, and aquifers need to be described and the potential impact to these resources inspected. Current guidelines for hazardous waste sites require a minimum distance of 150 meters from the nearest water well. "For protection of surface water, siting on a floodplain is prohibited, surface runoff must be at least 150 meters from any body of surface water" (Speidel, 1988). Groundwater and surface water contamination from the facility is conceivable during the life of the site. These dangers need identification and description in the EIR/EIS.

Further, the EIR/EIS needs to present technical information related to the determination of the 100 year flood line. Referencing the San Bernardino County Hydrology Manual is not sufficient for the proposed project document. Predictions of particular flood frequency and extent are reasonably accurate only if sufficient stream flow data are available over a long period. Which rivers or washes were used to determine the flood predictions in the Broadwell Dry Lake watershed? How far back does the historical data (from which the EMA maps were derived) date? Data, methods and associated assumptions for determining the flood frequency curve should be presented. Was the "rational" or "synthetic unit hydrograph" method used in this case? The EIR/EIS should describe alternative methods for determining the 100 year flood line and mapping of alternative lines.

Mean annual floods are used to determine the flooding frequency curve, thus there exists a danger of flood intensities greater than the 100 year flood. What potential is there for flooding of the proposed facility waste storage unit if it lies below the 100 flood line, as determined?

Hazardous Wastes:

Types of hazardous wastes to be stored in the proposed facility need to be defined in the EIR/EIS. Included in this analysis should be exact percentages of each type of hazardous waste to be allowed at the site and their stability within the storage containers and in nature. Because of the ultimate return of waste by-products from disposal sites to the environment, consideration of the toxicity of the wastes types is essential as well.

The hazardous and toxic nature of the wastes to be stored at the proposed site mandate that emergency procedures be developed and presented in the draft environmental analysis document. Will the facility contain an in-house fire suppression unit? If existing emergency personnel resources are to be used, what will be the travel/response time in case of an emergency event? In addition, what are potential air quality problems in the case of a fire?

Geology:
Due to the nature of the project the geological resources involved are of paramount concern. Analysis of surface and subsurface soils, as well as rock types, porosity, geologic history and local faults is essential. Within this analysis should be an inventory of mining resources in the project area, claims held and their status, and the impacts that the proposed specific hazardous waste facility will have on existing claims, potential mineral and energy resources.

Wilderness Study Lands:
The Sleeping Beauty Mountains WSA contains the South Cady Mountains and a large, sweeping bajada which is relatively undisturbed by man and is within very easy reach of the growing desert center of Barstow/Daggett. In addition, it is particularly accessible to urban visitors from Los Angeles via Interstate 40 on the south and Interstate 15 making it an important recreational resource. Outstanding opportunities exist for unconfined recreation, a feeling of isolation and solitude, and excellent rockhounding possibilities abound. The proposed hazardous waste facility by Broadwell Corporation will seriously threaten the primeval nature of the Sleeping Beauty Mountains WSA by causing, air, water, wildlife, noise, and visual degradation to its naturalness. The EIR/EIS must embody a detailed study of the impacts this project will have on recreational values in the area.

The proposed specific hazardous waste facility site and access roads lies directly adjacent to the Cady Mountains WSA (CDCA-251), the Mesquite Springs WSA (CDCA-251A), the Kelso Dunes WSA (CDCA-250), and the Old Woman Mountains WSA (CDCA-256). Direct impacts (visual, recreational, air quality, ground and surface hydrology, wildlife population fragmentation and displacement) and indirect impacts (e.g. dust, noise) to these adjacent WSA lands are requisite in the EIR/EIS. Additionally, the EIR/EIS should examine the alternative of rerouting the four miles (approximately) of access road outside of any wilderness study lands.

Cultural Resources:
The Sleeping Beauty Mountains and surrounding lands possess a great wealth of cultural artifacts and resources which must be protected. The EIR/EIS needs to consider issues related to Indian tribes which inhabited the area, including all aboriginal trails, lithic scatters, rock shelters, camp sites, etc. of any known cultural resource sites. Indirect impacts to cultural resources found in adjacent lands must also be examined.

APPENDIX C

APPENDIX C - DRAFT EIR/EIS DISTRIBUTION LIST

FEDERAL OFFICIALS AND AGENCIES

Senator Alan Cranston
Honorable Jerry Lewis
James Arnold, Assistant U.S. Attorney
U.S. Army Corps of Engineers
U.S. Bureau of Mines
U.S. Department of the Interior, Fish and Wildlife Service
U.S. Environmental Protection Agency
U.S. Geological Survey
U.S. Marine Corps Air-Ground Base

STATE OF CALIFORNIA OFFICIALS, AGENCIES, AND REGIONAL AGENCIES

Senator Bill Leonard
Air Resources Board (Jim Behrmann)
California Department of Conservation (Dennis O'Bryant)
California Department of Fish and Game (Bud Vernoy, Carrie Shaw)
California Department of Health (Arlene Chance)
California Department of Health Services (Subhash C. Agarwal)
California Department of Health Services, Toxic Substances Control Program (Robin Reynolds)
California Department of Transportation, Office of Environmental Affairs
California Department of Transportation (Richard Malacoff)
California Department of Water Resources (Nadell Gayou)
California Highway Patrol, Long Range Planning Department, Sacramento
California Highway Patrol (Jim Pitsor)
California Regional Water Quality Control Board, Lahontan Region (Michael Wochnick)
California State Historic Preservation Officer
California State Lands Commission
California State Library
California State University, Fullerton (Dr. Don McClanahan)
California Waste Management Board (Jeannie Blakeslee)
Native American Heritage Commission (William Johnson)
Office of Permit Assistance (Christine Kinne)
Office of Planning and Research (State Clearinghouse)
Southern California Hazardous Waste Management Authority (Philip Fernando)

COUNTY AND CITY ORGANIZATIONS

Air Pollution Control District (Oscar Hellrich)
County Department of Environmental Health Services (Peter Brierty)
Office of the Mayor, Barstow

ORGANIZATIONS

American Wilderness Alliance (Clifton Merritt)
Baker Community Service District, Baker, California
Broadwell Corporation
California Association of 4WD Clubs (Patrice Davison)
California Desert Studies (Dr. Jerald Scherba)
California Mining Assocation (William Tilden)
California Native Plant Society (Dr. June Latting)
California Wilderness Coalition (Jim Faton)
California Wilderness Coalition, Davis
Chemehuevi Indian Tribe (Domingo Chance Esquerra)
Citizens for an East Mojave National Park (Peter Burk)
Colorado River Tribal Council (Weldon Johnson)
CORVA (Steve Kuehl)
Defenders of Wildlife (Richard Spotts)
Desert Advisory Council (Chuck Bell, Dana Bell, Dave Fisher, Dr. Kenneth Norris, Elden Hughes, James Bagley, Mary Ann Fisher, Mary DeDecker, Patricia "Corky" Larson, Richard Milanovich, Robert Filler, Sharon Appelbaum, Susan Hickman, Fred Owings, and William Claypool).
Desert Bighorn Council (Richard Weaver)
Desert Bighorn Council, Riverside
Desert Protection Council (Howard and Harriet Allen, Mary Swedelius)
Desert Survivors (W. Douglas Kart)
Desert Tortoise Council, Palm Desert, California
Fort Mojave Tribal Council
Greenpeace (Margie Kelly)
Hidden Valley Resources, Inc. (Brian Patrick)
High Desert Multiple Use Coalition
Isaak Walton League
National Association of Mining Districts
National Audubon Society (Brock Evans)
National Federation of Federal Employees, Local Number 759 (Joaquin Villa)
National Parks and Conservation Association, Cottonwood, Arizona
National Parks and Conservation Association (Russell Butcher)
National Wildlife Federation (David Alberswerth)

ORGANIZATIONS, CONTINUED

Natural Resources Defense Council
Natural Resources Defense Council (Johanna Wald)
Providence Mountain State Recreation Area, Essex, California
San Bernardino County Library, Barstow
San Bernardino County Library, Victorville
Santa Fe Pacific, Inc.
Sea and Sage Audubon Society (Nancy Klotzsche)
Sierra Club, Desert Committee (Judy Anderson)
Sierra Club Legal Defense Fund (Deborah Reames)
Sierra Club - Mohave Group (Scott Simons)
Sierra Club (Bill Havert)
Society for the Conservation of Bighorn Sheep (James DeForge)
Southern California Edison Company (Art Cheng)
The Sun (Sam Atwood)
UC Granite Mountain Preserve
United Mining Council (William Dare)
University of California Library, Irvine
Western Miner Council (Gregory Ouellette)
Wilderness Society (Mike Gonella, Joan Reiss)
Wilderness Society, Washington, D.C.

INDIVIDUALS

Susan Agnessens
Harriet Allen
L. Thomas Bayne
Mark Carver
Dennis Casebier
Jim Dodson
Evelyn Engle
Don Fiff
Wilson B. Goddard
Rick Hammel
Chris Hansen
Ronald & Mary Ann Henry
W. Douglas Kari
Harold Knoll, Jr.
Diane Marenco
Vince Markofski

INDIVIDUALS, CONTINUED

Dr. Don McClanahan
Diane L. Mitchell
W.R. Moyle, Jr.
Frank Patrick, III
Tony Skidmore
Dr. Robert Stebbins
Bill Zielinski

APPENDIX D

APPENDIX D - ALTERNATE SITE ANALYSIS

Prior to selecting the Broadwell Basin Residuals Repository site, a number of other locations in the desert were considered and evaluated in varying degrees of detail and ultimately were rejected. This section of the document discusses the site selection criteria used by the Broadwell Corporation (applicant) in evaluating the suitability of each alternative site, and discusses the application of the appropriate selection criteria to each of the alternative locations. The BLM and the County of San Bernardino have independently reviewed and analyzed the following information, and based on that analysis, conclude that the alternative dry lake desert sites discussed below are infeasible for the reasons discussed below.

In searching for a preferred site among the many alternative sites, the applicant established a set of threshold selection criteria. These criteria included physical, natural, institutional, and man-made system constraints that either had to be met or closely approximated for a site to be considered feasible as a location for a residuals repository. The criteria the applicant selected were:

1. The site's substrate must offer natural geologic materials which have a low permeability and offer at least five feet of separation from underlying groundwater. The site either must meet the Title 23 CCR Chapter 15 prescriptive standards for hazardous waste landfills or must be capable of supporting engineered solutions providing equivalent protection.
2. The site should not be located adjacent to or near a known active fault.
3. The site should not be located in a groundwater basin which is being used to supply domestic water or where the groundwater table is near the surface, and should not be on the list of regional groundwater aquifers in the County General Plan and County Hazardous Waste Management Plan (CHWMP). (See the County General Plan Policy WA-8(b) attached hereto as Exhibit A.)
4. The site should not be located in close proximity to existing residences or within 2,000 feet of an urban or urbanizing area in accordance with the applicable county planning criteria for hazardous residuals repositories.
5. The site should have good access from a major interstate highway and should avoid extensive use of existing local roads. Access should avoid human populations and Wilderness Study Areas to the extent possible and should not be of a length or require other construction features that would make the project infeasible due to costs of constructing the access road.
6. The site must be on private land, it should not be in the East Mojave National Scenic Area (EMNSA). Support resources must be available to the site from areas outside of any Wilderness Study Area.
7. The site must have some water availability, as evidenced in available literature, since large quantities of water would be needed to construct the repository.
8. The site, as a prospective hazardous residuals repository, must pose no obvious conflicts with certain surrounding land uses, such as military activity, residential use, or agricultural activities, etc.

These threshold siting criteria for a hazardous residuals repository site can be categorized generally into several groups: 1) those which seek to avoid or minimize the human and environmental risks and stresses related to the transportation, handling, or long-term management of the waste (such as air pollution due to long hauling distances); 2) those which seek to avoid land use conflicts; and 3) those which seek to maximize the isolation and natural protection afforded the disposed residuals, wholly apart from the man-made protections contained in the repository design. The third group of criteria relate to the geological and hydrological advantages of a location.

Consideration of all three groups of criteria has led to an intensive focus in recent years on possible desert locations for a site to serve Southern California's hazardous waste disposal needs. The desert's generally sparse population levels minimize risks of human exposure to the wastes. The sparse population also tends to minimize land use conflicts, so long as wildlife habitat, recreational, wilderness and mining values are also taken into account. The California desert's relative proximity to the centers of waste generation nearer the coast result in transportation distances that are acceptable, compared to the alternatives of siting a facility nearer to major populations or at a still greater distance, in Northern California or across state lines. Compared with non-desert areas of the state, the low levels of rainfall tend to reduce problems associated with rainwater infiltration of the wastes or with management of surface run-on or run-off.

All of these factors favor selection of a site in the Mojave desert to serve the Southern California hazardous waste generator community. Accordingly, the applicant focused its site search in the desert.

The applicant's second level of siting inquiry related to which type of desert geological setting would provide the most effective natural isolation of the wastes. The hazardous waste disposal facility design and operations requirements specified in state and federal regulations are designed to prevent escape of hazardous wastes into the surrounding environment. In theory, a disposal facility could be safely sited in most locations if it were properly designed to provide man-made protection and isolation for the wastes. However, the topographical, geological, and hydrological features of a site can provide effective threshold protections offering important additional safety factors should any wastes escape containment. While no known geological setting in California would provide complete isolation of wastes absent man-made protections, certain geological environments offer clear advantages over others.

Mountains, mesas, or other elevated sites are typically composed of weathered rock, prone to internal fracturing. This means that if contaminants were to escape from a facility so located, they could travel highly unpredictable routes through the rock fractures. In such circumstances, remediation is very difficult. Past experience with hazardous waste disposal facilities located over bedrock that was believed to be secure but later proved to be fractured (as at the Stringfellow Acid Pits in Riverside County, California), coupled with the difficulty of working in bedrock to obtain a uniform working surface, led the applicant to seek alternatives to bedrock sites.

Both elevated areas and the alluvial fans at the base of elevated areas tend to serve as groundwater recharge areas, due to the porous nature of the soil and rock. The finer soil and clay particles from elevated and alluvial areas are carried in rainwater runoff to lower elevations. In the desert, the lowest elevations frequently are dry lake beds, or playas, which over geologic time accumulate thick layers of clay deposited there by the runoff from surrounding areas. The presence of these often very thick, very low permeability clay layers means that water which reaches the surface of playas tends to evaporate rather than to percolate through the clay and recharge groundwater.

Playa dry lakes provide other siting advantages. While being at the center of a flood plain conflicts with one general siting preference, that problem is relatively easily solved in a desert setting by designing an aboveground disposal facility with berms adequate to prevent surface water drainage onto the facility. The advantage of such a low-elevation location is that if any surface rainwater were to become contaminated, it would tend not to leave the site as runoff but rather would collect on the lake bed and evaporate in place, where any contamination could most easily be monitored and remediated. Further, should any contaminates escape and reach groundwater, detection and remediation would be relatively straightforward, unlike the problems of locating and remediating contaminant plumes in bedrock areas.

Finally, groundwater hydrology related to playa dry lakes tends to be favorable for siting a residuals repository. Groundwater underlying the playas tends to be of relatively poor quality because of high quantities of dissolved solids and high concentrations of ions such as sodium, chloride, boron, and fluorine. Therefore, these groundwater resources tend not to have other beneficial uses that would be jeopardized should leakage from the facility occur. Naturally, if a playa dry lake is located in a groundwater basin that is being used to supply domestic water or that is on the County's list of regional groundwater aquifers, those considerations would override the threshold screening presumption that poor quality water immediately underlies the playa.

For all of these reasons, and because playa dry lakes were recommended as promising locations for disposal sites in a study conducted by the California Division of Mines and Geology, the applicant's site selection process focused on potential dry lake sites in the California desert.

The California Mines and Geology study, Special Publication 44, "Potential Disposal Sites for Class I Waste in Southern California" (1973) evaluated and compared the suitability of 20 dry lakes. The applicant evaluated these same dry lakes; but because the California Mines and Geology study had not evaluated all possible dry lake sites and because in the intervening years, the southern and western areas of the desert have become increasingly populated, the applicant also evaluated an additional dry lake (Broadwell), which seemed to offer competitive features and which was located somewhat further east than most of those in the original study. The alternative lake beds examined include:

Bristol
Broadwell
Cadiz
Coyote
Cuddeback
Danby
East Cronese
Galway
Harper
Lavic
Lucerne
Means
Melville
Mirage
Rabbit
Reed
Silver
Soda
Soggy
Troy
West Cronese

Each of the sites listed above and shown on Figure D-1 were evaluated, applying the eight threshold criteria listed above. When one of the selection criteria was not met or when the site had difficulty in meeting the overall set of criteria, the prospective site was removed from further consideration as infeasible. In the alphabetical order presented above, the following findings were made:

1. *Bristol*: Bristol Dry Lake has a high water table (DWR Bulletin No. 91-14), and commercial salt production occurs on the lake. This creates a potential land use conflict with a commercial facility whose products may end up being consumed by humans. The combination of these two factors was judged to create an insurmountable land use conflict between hazardous waste disposal and existing uses of Bristol Dry Lake.

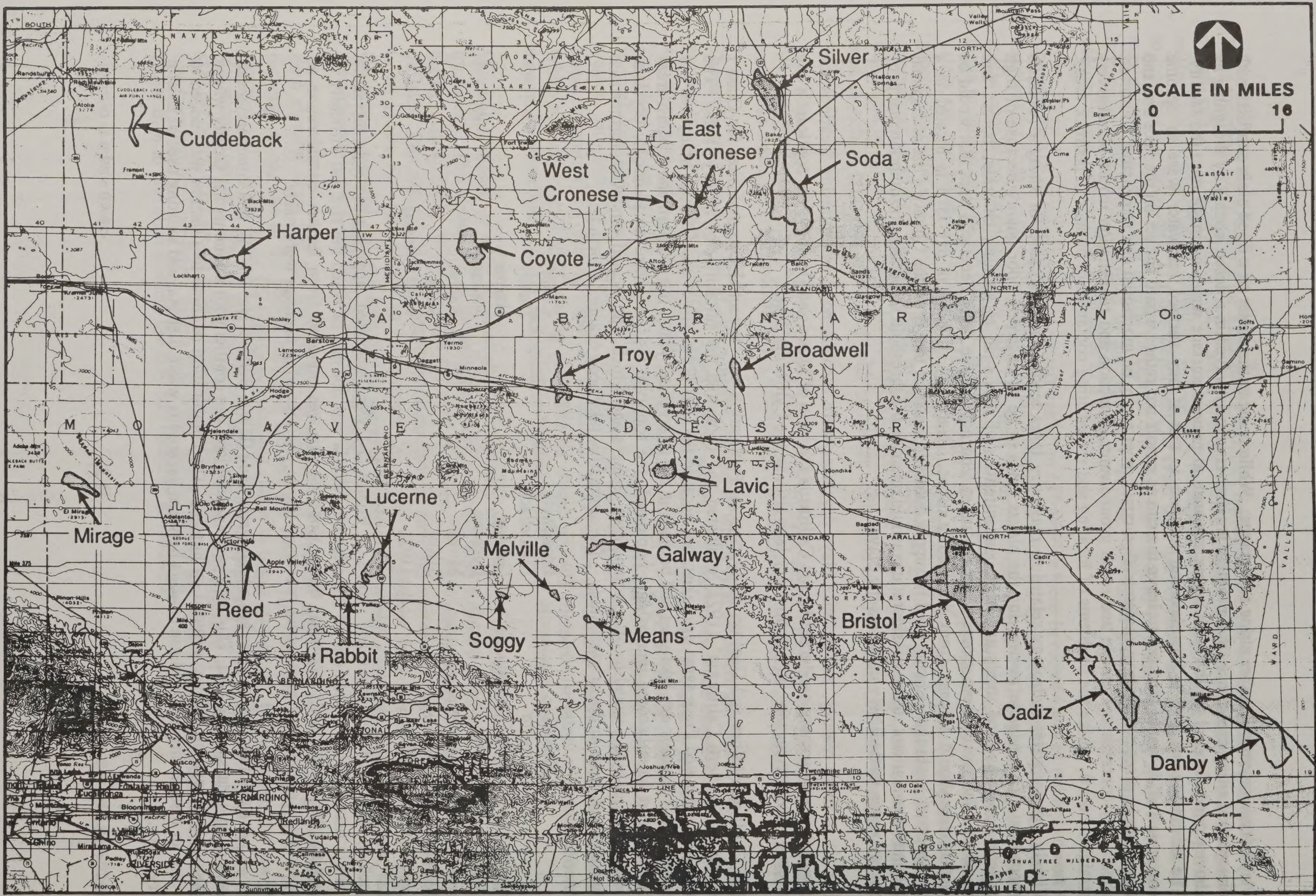

Figure D-1 Dry Lake Beds Investigated by Broadwell Corporation for the Siting of a Specified Hazardous Waste Facility

BB205

Regarding the other criteria, the site is located more than 20 miles from Interstate 40 either along the National Trails Highway (a two-lane road that passes through residential areas) or along Kelbaker Road and National Trails Highway. The distance involved and the use of local roads were found to be problematical.

Bristol Dry Lake is designated as a Class I Multiple-Use Class on the BLM's California Desert Conservation Area Plan (1980) ("CDCA Plan"). Class I allows intensive use (as defined in Chapter 2 of the CDCA Plan). All text references to multiple-use classes were obtained from the CDCA Plan map.

The issues outlined above were judged collectively to present constraints too significant to be overcome, and therefore this site was eliminated from further consideration as infeasible.

[NOTE: The County's Hazardous Waste Management Plan (1990) ("CHWMP"), developed subsequent to the applicant's own analysis, includes siting criteria for residuals repositories and other specified hazardous waste facilities (see Exhibit B). A review of the CHWMP criteria, not included in the applicant's own analysis, has been added here in the form of parenthetical notes. Use of the Bristol site would conflict with CHWMP siting criteria Nos. 21 and 22, which state that hazardous waste facilities "should have good access to and from major transportation routes", and "should be sited so that road networks leading to major transportation routes do not pass through residential neighborhoods...[and are] safe with regard to road design and construction, accidents rates, excessive traffic, etc." CHWMP at page 5-31.

In addition, the Bristol site's Class I Multiple-Use designation may raise a conflict with Siting Criterion No. 16, which states that hazardous waste facilities shall not be located in recreational resource areas.]

2. *Broadwell*: Broadwell Dry Lake was found to meet all of the above criteria, except that the access road, Crucero Road, must pass through the edges of WSAs 250 and/or 252 (see discussion at the end of this section). Broadwell Dry Lake is designated as a Class M (Moderate Use) Multiple-Use Class on BLM's CDCA Plan.

3. *Cadiz*: In the past few years grape production has been established in the Cadiz Valley which relies on the groundwater aquifer in the basin. The heavy pumping of the aquifer for irrigation could cause subsidence in the Cadiz Basin which could not be controlled at a waste disposal site. Further, the use of this aquifer for a product that is directly consumed by the public creates a clear land use conflict.

The presence of a major migrating sand dune complex would create a surface management problem for any facility on the lake bed, and, moreover, indicates the potential for permeable sand beds in the lake bed below the surface.

Finally, Cadiz Dry Lake is located more than 30 miles from Interstate 40 using local two-lane roads. Improvement and maintenance of the access road from Interstate 40 to serve the heavy trucks hauling the waste to the project site made this site an uneconomic location. If accessed from the south along Twentynine Palms Highway, the waste would have to be routed on local roads through the Morongo Basin with its numerous small communities.

Cadiz Dry Lake is designated as a Class I Multiple-Use Class on the CDCA Plan.

The land use conflicts, inaccessibility, geologic conditions, and unacceptable economic costs were the basis for rejecting Cadiz Dry Lake from further consideration as infeasible.

[NOTE: The use of the Cadiz site for the project would raise possible conflicts with CHWMP Siting Criteria Nos. 20 and 21, discussed above, relative to safe transportation of hazardous waste. In addition, it might raise a conflict with Criterion No. 9, relating to protection of groundwater quality, given the increasing use of groundwater basin in Cadiz Valley for agricultural irrigation.]

4. *Coyote*: Coyote Dry Lake is adjacent to and west of a right-of-way used by the Fort Irwin Military Reservation; thus, the disposal of hazardous wastes in this area was judged to pose a significant land use conflict with military activities. Also, use of this site would require transporting hazardous wastes through the Harvard area, which contains some residences and agricultural uses.

Another major concern at this location is that water wells located in this basin are significant sources of supply for municipal uses and for consumptive uses, particularly the military community.

Finally, based on a preliminary field investigation, the clay at Coyote Dry Lake was not deposited with consistent bed structure.

Coyote Dry Lake is designated as a Class M Multiple-Use Class on the CDCA Plan.

In summary, problems associated with the Coyote Dry Lake location were the use of the basin for municipal water supply; probable land use conflicts with the military; the mixing of hazardous waste trucks with other traffic on local roads; and inconsistent lake bed geology. Accordingly, this site was rejected from further consideration as infeasible.

[NOTE: Use of this site for the project would raise possible conflicts with CHWMP Criteria Nos. 20 and 21, relating to safe transportation of hazardous wastes; and No. 9, relating to protection of groundwater quality.]

5. *Cuddeback*: Historically, Cuddeback Dry Lake has been used by the U. S. military as an aerial bombing range, and it could not be determined to be decontaminated by the military.

Use of this site would require construction of approximately 15 miles of new road through prime desert tortoise habitat. The tortoise is a state and federally listed threatened species. In addition, access would be from heavily-traveled Highway 395 through several communities (either Victorville and Adelanto; or Lancaster, Rosamond, Mojave, and Boron; or Barstow and Hinckley) and along poor quality two-lane roads (Highway 395 or Highway 58). These routes were considered unsafe.

Cuddeback Dry Lake is located in a Class L (limited) Multiple-Use Class on the BLM's CDCA Plan. This designation excludes the siting of hazardous waste sites. An amendment to the CDCA Plan and a land exchange would be required before such a facility could be located on public lands on this dry lake. On private lands such an amendment and exchange would not be required.

Based on the above factors, Cuddeback Dry Lake was rejected from further consideration as infeasible.

[NOTE: Use of this site for the project would involve possible conflict with CHWMP Siting Criteria Nos. 20 and 21, relating to safe transportation of hazardous wastes; No. 14, relating to non-impairment of the viability of critical habitats of threatened, rare, or endangered species; and, because of the Class L Multiple-Use designation, No. 16, regarding protection of resource areas of regional or national significance, value, or importance.]

6. *Danby*: Danby Dry Lake is located southeast of Cadiz Dry Lake. Like Cadiz, it is remote, and requires travel along two-lane roads for such a distance that the cost and maintenance of the roads would be very high. In addition, these two-lane roads, particularly including Highway 62, pass through many small communities. Use of such roads for primary access to a hazardous residuals repository would present significant public safety concerns.

Historically, salts marketed for human consumption have been mined in this lake; this could present a future conflict in land use.

Danby Dry Lake is located in both Class I (intensive) and Class M (moderate) Multiple-Use Classes in the CDCA Plan.

Because of the long travel distance to the site, the very high cost of improving and maintaining roads, the travel through desert urban areas on two-lane roads, and the possibility of future mining of table salt at the lake, Danby Dry Lake was excluded from further consideration as infeasible.

[NOTE: Use of this site for the project would involve possible conflict with CHWMP Siting Criteria Nos. 20 and 21, relating to safe transportation of hazardous wastes.]

7. *East Cronese*: East Cronese Dry Lake is located within Wilderness Study Area 242. The area also includes a designated ACEC (Area of Critical Environmental Concern), Cronese Lake. It is located very near the terminus of the Mojave River Valley, which is identified in the County General Plan as a regional aquifer of concern. (County General Plan, page II-C-25.) East Cronese Dry Lake is located in a Class L (limited) Multiple-Use Class on the CDCA Plan. An amendment to the CDCA Plan and a land exchange would be required before a hazardous residuals repository could be located on public land at this dry lake.

Based on these factors, East Cronese Dry Lake was rejected from further consideration as infeasible.

[NOTE: Use of this site would raise possible conflicts with CHWMP Siting Criteria No. 16, related to avoidance of resource areas of local, regional, state, or national significance, including ecological preserves, due to the ACEC and the Class L Multiple-Use designations; and No. 9, regarding protection of groundwater quality, and particularly regional aquifers.

8. *Galway*: In the California Division of Mines and Geology, Special Publication No. 44 (CDMG 1973), Galway Dry Lake was identified as one of the better possible hazardous waste disposal site locations. Careful consideration was therefore given to Galway, with each of the site selection issues considered in some detail. Based on the cited publication and other data, it appears that the substrate would be capable of meeting the 23 CCR Chapter 15 criteria for a hazardous waste landfill.

Galway is located in the Ames Valley Basin which is listed as one of the water basins in the County's General Plan (page II-C-25) where hazardous waste repositories should be prohibited.

Galway Dry Lake is underlain by a fault that has had historic movement in 1975 and perhaps even more recently (CDMG 1975). This fault exposure at Galway was discovered subsequent to Special Publication No. 44's identification of Galway as a preferred site.

Galway Dry Lake is not directly adjacent to any residences, but it is not easily accessible to any major freeway or interstate road. Depending upon where the waste is generated, the access routes would be Interstates 10 and 15, and State Highways 62, 18, and 247. All the state highways are two-lane roads through small urbanized areas and rural inhabited areas. Substantial improvements would have to be made to these roads, as well as to local roads such as Bessemer Mine Road.

Galway Dry Lake lies partially within the Twentynine Palms Marine Corps Base (MCAGCC), which poses a potentially severe land use conflict. In addition, Galway Dry Lake is located in a Class I (intensive) Multiple-Use Class on the CDCA Plan. It is within one of the major open areas which allows unrestricted off-highway vehicle activity. This poses a further conflict with a potential for trespass and conflict with recreational uses on the dry lake bed.

No WSAs are located along the possible access alignments. Private land is available at Galway Dry Lake.

The protected status of the water basin, the presence of an active fault, the necessity for surface transport of waste through populated areas, and the land use conflicts were issues judged to be in such conflict with a proposed hazardous waste repository that Galway was rejected from further consideration as infeasible.

[NOTE: Use of Galway as the project site would raise possible conflicts with CHWMP Siting Criteria No. 9, relating to protection of groundwater quality of regional aquifers; No. 7, related to siting in areas of potential rapid geologic change; No. 18, regarding avoidance of sites on military lands, and Nos. 20 and 21, relating to safe transportation of hazardous wastes.]

9. *Harper*: Harper Dry Lake is located within the Harper Valley regional aquifer. (County General Plan, page II-C-25.) It also contains an ACEC and is the location of a major desert riparian/wetland habitat.

Access to the site is over two-lane roads through numerous small communities presenting significant public safety concerns.

Harper Dry Lake is located in a Class L (limited) Multiple-Use Class on the CDCA Plan which is not suitable for a hazardous waste repository. A plan amendment would have to be obtained for use of any public land in support of such a use, and a land exchange accomplished for any public land proposed to be used for the hazardous waste portion of the project. Such an amendment and exchange would not be required for use of private land.

For these reasons, Harper Dry Lake was rejected as an infeasible repository location.

[NOTE: Use of Harper as the project site would raise possible conflicts with CHWMP Siting Criteria No. 9, relating to protection of groundwater quality of regional aquifers; No. 13, regarding non-impairment of wetlands; No. 16, regarding avoidance of resource areas identified as having significant recreational ecological, or other value; and Nos. 20 and 21, regarding safe transportation of hazardous wastes.]

10. *Lavic*: Lavic Dry Lake is located within the Twentynine Palms Marine Corps Base (see map at page 57 of CDCA Plan) and, after extensive discussions with the Marines, it was rejected as a suitable repository location because, according to the Marines, it is inaccessible and unavailable. Consideration of a location on a military base conflicts with policies in the County General Plan. Lavic Dry Lake is not within BLM's jurisdiction because it is within a military reservation; therefore no CDCA Plan land use designation applies to this location.

These factors were judged so significant that Lavic was rejected from further consideration as infeasible.

[NOTE: Use of the Lavic site would raise a clear conflict with CHWMP Siting Criterion No. 18, relating to avoidance of siting on military lands.]

11. *Lucerne*: Lucerne Dry Lake is located within the Lucerne Valley regional aquifer (County General Plan, page II-C-25.) Access would be possible only through populated areas. Surrounding residential and agricultural land uses create a severe public safety and land use compatibility problem. Lucerne Dry Lake is mostly in private ownership and does not have a designation in the CDCA Plan.

For these several reasons related to public safety, Lucerne Dry Lake was rejected as a possible site.

[NOTE: Use of the Lucerne site for the project would raise probable conflicts with CHWMP Siting Criteria No. 9, regarding protection of the quality of regional groundwater aquifers, and Nos. 20 and 21, regarding safe transportation of hazardous wastes.]

12. *Means*: Means Dry Lake is located near Galway Dry Lake and is subject to several of the same land use constraints. Specifically, Means Dry Lake is located in the Means Valley regional aquifer designated in the County General Plan, at page II-C-25. It must be accessed along the same two-lane routes through numerous communities as Galway which presents public safety concerns, and conflicts with the County's General Plan. Residences also are present in the general vicinity of Means Dry Lake, which create a land use conflict.

The water table at Means Dry Lake is near the surface and may even reach the surface during some years (DWR 1975). Means Dry Lake is owned entirely by the federal government and no private land is available for use as a repository. This area is located in a Class I (intensive) Multiple-Use Class in the CDCA Plan. Like Galway, this site is within an open area and is subject to heavy off-highway vehicle recreational activity. Withdrawal and exchange of federal land from this open area would require CDCA Plan amendments and would create a major land use conflict.

Based on these several findings, Means Dry Lake was eliminated from further consideration as infeasible.

[NOTE: Use of the Means site for the project would raise probable conflicts with CHWMP Siting Criteria No. 9, regarding protection of the quality of regional groundwater aquifers; No. 16, relating to avoidance of resource areas identified as having significant recreational value; and Nos. 20 and 21, regarding safe transportation of hazardous wastes.]

13. *Melville*: Melville Dry Lake is subject to findings similar to those made for Means Dry Lake. Melville is located within a regional aquifer designated in the County General Plan. Access to Melville presents public safety concerns because of routing through small communities on poor two-lane roads.

Melville is all federally owned and is designated as Class I Multiple-Use Class in the CDCA Plan. It would require a land exchange with the BLM to be used as a repository site. It is part of the open area and poses the same institutional problems as Means. For these reasons, it was eliminated from further consideration.

[NOTE: Use of the Melville site for the project would raise probable conflicts with CHWMP Siting Criteria No. 9, regarding protection of the quality of regional groundwater aquifers; No. 16, relating to avoidance of resource areas identified as having significant recreational value; and Nos. 20 and 21, regarding safe transportation of hazardous wastes.]

14. *El Mirage*: El Mirage Dry Lake is located in a populated area within the El Mirage Valley regional aquifer designated in the County General Plan, at page II-C-25. It is also a highly used recreation area that is rapidly urbanizing.

Access to El Mirage is primarily on two-lane roads, and the access routes proceed through populated areas, posing serious public safety concerns.

The federal portion of this dry lake (about 60%) is designated as a Class I Multiple-Use Class in the CDCA Plan. This area is also used for off-highway vehicle activities. In fact, the Management Plan for the El Mirage Cooperative Management Area (August 1990) calls for the BLM's acquisition of El Mirage Dry Lake for off-highway vehicle recreational purposes.

Because of these several findings, the site was judged infeasible.

[NOTE: Use of the El Mirage site for the project would raise probable conflicts with CHWMP Siting Criteria No. 9, regarding protection of the quality of regional groundwater aquifers; No. 16, relating to avoidance of resource areas identified as having significant recreational value; and Nos. 20 and 21, regarding safe transportation of hazardous wastes.]

15. *Rabbit*: Rabbit Dry Lake is located within a designated regional aquifer and has poor access on two-lane roads. It is located within a rapidly urbanizing area, and residences exist near the potential project site.

Rabbit Dry Lake is very small (less than 300 acres). It lies totally within private ownership directly adjacent to the major east-west road in the area, Highway 18. On the basis of these several findings, Rabbit Dry Lake was rejected from further consideration as infeasible.

[NOTE: Use of the Rabbit site for the project would raise probable conflicts with CHWMP Siting Criteria No. 9, regarding protection of the quality of regional groundwater aquifers; and Nos. 20 and 21, regarding safe transportation of hazardous wastes.]

16. *Reed*: Reed Dry Lake is located within the urbanizing City of Apple Valley and involves land use conflicts. Access to the site is along two-lane roads. Reed Dry Lake is located within a regional aquifer designated in the County General Plan. It is privately owned. It is subject to severe flooding that has grown worse over the years because of increased runoff in its drainage basin due to development. For these several reasons, Reed was removed from further consideration as infeasible.

[NOTE: Use of the Reed site for the project would raise probable conflicts with CHWMP Siting Criteria No. 5, related to siting in flood plain areas; No. 9, regarding protection of the quality of regional groundwater aquifers; and Nos. 20 and 21, regarding safe transportation of hazardous wastes.]

17. *Silver*: After initial review Silver Dry Lake was identified for further consideration. Therefore, information is presented on each of the selection criteria identified at the beginning of this report. Based on data in the DWR publication "Water Wells and Springs in Soda, Silver, and Cronise Valleys, San Bernardino County, California" (DWR 1967), the clay at Silver Dry Lake can be considered generally suitable for evaluation in this document.

An existing fault was found to cross the middle of Silver Dry Lake from northwest to southeast (CDMG 1978). A review of other literature indicates that it may not be considered a recently active fault (CDMG 1975), but this would require further examination. Because of its location, the fault presents an issue of concern.

Silver Lake Basin was not on the list of regional aquifers in the County General Plan. But it is the basin that supplies domestic water to the community of Baker, which includes a major food and rest stop for travelers along Interstate 15 to Las Vegas. Silver Dry Lake is part of the recharge area for the community of Baker domestic water supply. The concept behind the regional aquifer policy is to prevent a hazardous waste repository from being located in an area which serves as recharge to an aquifer which is supplying domestic water. Moreover, use of large quantities of water for a hazardous waste repository could reduce domestic water supplies and could cause intrusion of highly saline water from the Soda Lake Basin which is directly adjacent to and apparently connected to the Silver Dry Lake Basin groundwater aquifer. All of these water-related issues pose a significant potential conflict over water quality and water quantity.

Residences and an airport are located directly adjacent to the southern end of the dry lake, which is the only private land on the lake bed large enough to meet a disposal site size requirement. The airport's runway is oriented so that take-offs and landings must cross over the private land at the south end of the dry lake bed, creating a land use conflict at this location.

Most of Silver Dry Lake is located within Wilderness Study Area 242. (See map at page 57 of CDCA Plan). In fact, there does not appear to be adequate private land on the lake bed outside of the Wilderness Study Area to locate a facility and associated facilities. Public land within the WSA is not available for exchange for a repository until a final decision on its wilderness status by Congress. There is some private land along the northern end, where a small parcel of private land overlies a site that is too small (less than a half-section) for a repository on the lake bed.

Access to Silver Lake is obtained from Interstate 15 over State Highway 127, the southern route into Death Valley. Traffic would pass through the community of Baker unless a bypass route was constructed outside the community. Such a bypass would require passage through at least one Wilderness Study Area (242 or 228), which right-of-way would have to be reasonable and necessary for use of the private land within the WSA.

This whole area is considered a major recreation area by the BLM; and the traffic on Highway 127, in conjunction with conflicts with recreation activities, would create serious land use conflicts.

In addition to the major site selection factors, the Silver Dry Lake site is approximately 25 miles further from generation sources than the Broadwell Dry Lake site. Use of the Silver Lake site would result in an approximately 15% increase in mobile source emissions, and significantly greater transportation costs.

The Silver Dry Lake site was rejected as infeasible because of seismic uncertainty, major water resource conflicts, significant land use conflicts, public safety problems related to transportation access, and the other major institutional problems outlined above. Silver Dry Lake is much less suitable than the Broadwell Dry Lake location and does not provide any reduction in the impacts identified for the Broadwell site.

[NOTE: Use of Silver for the project could raise possible conflicts with CHWMP Siting Criteria No. 3, related to proximity to public facilities (airport); No. 6, relating to proximity to recently active faults; No. 9, relating to protection of groundwater quality; No. 12, relating to the Clean Air Act and potential wilderness areas; No. 16, relating to avoidance of resource areas of recreational or other significance; and Nos. 19-21, relating to safe transportation of hazardous waste.]

18. *Soda*: Soda Dry Lake has unsuitable clays due to the high salt content and the high water table beneath the lake. It is located at the lower end of the Mojave River which is in overdraft. Further, an endangered fish species (Mojave Tui Chub) is dependent upon water levels in this basin and additional consumption could cause adverse impacts to this species. The drainage basin contributing to Soda Dry Lake is so large that it was not considered economically feasible to design a facility that could withstand the maximum precipitation event within the Mojave River watershed.

Soda Dry Lake is located in the East Mojave National Scenic Area and is designated as Class L (limited) Multiple-Use in the CDCA Plan. To use any of this dry lake would require CDCA Plan amendments and a land exchange, creating a major conflict with the Scenic Area designation.

For these several reasons, Soda Dry Lake was judged to be unsuitable as a repository location and was eliminated from further consideration as infeasible.

[NOTE: Use of Soda for the project would raise possible conflicts with CHWMP Siting Criteria No. 5, relating to location in flood plain areas; No. 13, relating to non-impairment of endangered species habitat; and No. 16, relating to avoidance of resource areas of scenic, ecological or other significance.]

19. *Soggy*: Soggy Dry Lake is located west of Melville and suffers from the same problems, i.e., access, nearby populations, and being located in a designated regional aquifer. It also has a high water table as intimated by its name. Its playa area is too small and is under total federal ownership, and therefore would require a BLM land exchange to be used as a hazardous waste repository. It is located in a Class I Multiple-Use Class on the CDCA Plan. It is also within the Johnson Valley open area and is subject to the same land use conflicts with off-highway vehicle activity. This site was, therefore, judged to be infeasible and was eliminated from further consideration.

[NOTE: Use of Soggy for the project site would raise possible conflicts with CHWMP Siting Criteria No. 9, related to protection of a regional groundwater aquifer; No. 16, related to avoidance of resource areas of recreational or other significance; and Nos. 20 and 21, related to safe transportation of hazardous wastes.]

20. *Troy*: Troy Dry Lake is located in a designated regional aquifer. Access to the site would be along local two-lane roads through a populated area. Groundwater can be high within this basin, which makes it difficult to site a repository facility. The small portions of Troy Dry Lake are designated Class M (moderate) Multiple-Use Class on the CDCA Plan.

Troy Dry Lake was rejected as infeasible because of the regional aquifer issue and the requirement to use two-lane local roads through populated areas to access the dry lake.

[NOTE: Use of Troy for the project site would raise possible conflicts with CHWMP Siting Criteria No. 9, related to protection of a regional groundwater aquifer; and Nos. 20 and 21, related to safe transportation of hazardous wastes.]

21. *West Cronese*: West Cronese Dry Lake is located within Wilderness Study area 242. The area also includes a designated ACEC, Cronese Lake. It is located very near the terminus of the Mojave River Valley, which is identified as a regional aquifer of concern. County General Plan, page II-C-25. West Cronese Dry Lake is located in a Class L (limited) Multiple-Use Class on the CDCA Plan. An amendment to the CDCA Plan and a land exchange would be required before a hazardous residuals repository could be located on public land at this dry lake.

Based on these factors, West Cronese Dry Lake was rejected from further consideration as infeasible.

[NOTE: Use of West Cronese Dry Lake would raise possible conflicts with County Siting Criteria No. 9, relating to protection of a regional groundwater aquifer; No. 12, relating to the Clean Air Act and a potential wilderness areas; and No. 16, relating to avoidance of resource areas of ecological or other significance.]

Conclusions. After reviewing all of the 21 dry lake sites discussed above, it was concluded that Broadwell Dry Lake represented the only potential location that does not have a major constraint which would make it unsuitable for use. In relation to the criteria cited above, as to the Broadwell Dry Lake the following preliminary conclusions, all of which would be and are more fully evaluated in the project EIS/R, were reached:

a. The clay substrate on the lake bed conforms with the Subchapter 15 objectives.

b. The site is not located adjacent to or near a known active fault.

c. The Broadwell Basin does not supply groundwater for domestic purposes; the water table is over 75 feet deep at all locations tested in the basin thus far; and the Broadwell Basin is not considered a regional aquifer.

d. The nearest residences are more than eight miles distant.

e. Access to the site is totally by Interstates 15 and 40 to the Crucero Road off-ramp. From Interstate 40 north the road passes one residence adjacent to the freeway and then continues north to the site with no other constraints. If an alternative alignment is selected at the southern portion of the route, the access road would not pass near any residences. The existing Crucero Road forms the boundary between two Wilderness Study Areas along much of its length within Broadwell Basin, but the road itself is not within a WSA.

However, reasonable and necessary improvements required to utilize Crucero Road for the project would cause unavoidable impacts to the outer boundary of WSA 252 for a length of 15,420 feet and a width ranging in impact on the WSAs from 10 feet to 62 feet, involving a total disturbance of 5.14 acres (for a more detailed discussion, see Section 3.12 of this DEIR/S). From three-fourths to one-third of the road's width will include the width covered by the existing road, thus this impact was considered of minor significance in the site selection process. The length of the road that must be constructed is at the outer margins of what can be economically constructed and maintained, given the market in Southern California.

f. The repository site is on private land; it is not in the East Mojave National Scenic Area; and adequate resources are available from the immediate area without entering public lands within a WSA.

g. Water was known to occur in the basin, but the extent of resources was unknown until subsequent well drilling and testing. Based on hydrogeological evaluations, adequate resources exist to meet project demands without damaging the aquifer.

h. Land use conflicts were identified at Broadwell Dry Lake regarding potential degradation of adjacent WSAs and the realignment of Crucero Road. These issues were considered either avoidable or mitigable to nonsignificant levels. No agricultural, military, or residential uses exist on or adjacent to the project site.

In summary, major physical, natural, man-made, and institutional constraints were identified for every other dry lake location in the desert. Based on the alternatives analysis presented above, the Broadwell Dry Lake site was the only location that had sufficient merit to pursue as a repository site.

[NOTE: For a detailed discussion of the relationship between the Broadwell Dry Lake site and the CHWMP Siting Criteria, see Appendix E.]

APPENDIX E

APPENDIX E - COUNTY HAZARDOUS WASTE MANAGEMENT PLAN SITING CRITERIA AND THE BROADWELL DRY LAKE SITE

The San Bernardino County Hazardous Waste Management Plan (February, 1990) contains 22 siting criteria used to review the suitability of a site proposed for use as a hazardous waste facility. Appendix D to the DEIR/S, which discusses the Broadwell siting criteria, analyzes the County siting criteria numbers 1, 6, 8, 9, 10, 15, 18, 20, 21 and 22.

County Siting Criterion No. 1. Proximity to Residences. This County criterion requires a 2,000 foot buffer zone between residences and hazardous waste residual repositories, unless the owner demonstrates that less than 2,000 feet is adequate to protect the public health and safety. In addition, a risk assessment is required for hazardous waste facilities which should consider the type of waste to be handled, the design of the facility and any need for buffering residential areas. This criterion is met for the applicant's proposed project and is addressed by the applicant's own siting criterion No. 4. A discussion of this criterion's applicability to Broadwell Dry Lake is located in DEIR/S Appendix D, which indicates that the nearest residences are over 8 miles south of the project site. In addition, Section 4.1.12.2 of the DEIR/S discusses the risk assessment.

County Siting Criterion No. 2. Proximity to Immobile Population. The County requires that hazardous waste facilities be sited so that they pose no significant risk to immobile populations, which include schools, hospitals, prison facilities, etc. No such facilities are located anywhere near Broadwell's proposed project, and therefore this siting criterion is met.

County Siting Criterion No. 3. Proximity to Public Facilities. The County requires that hazardous waste facilities be sited so that they do not adversely impact the public health and safety of large numbers of people in public areas or in public facilities. The Broadwell project meets this County siting criterion because the project is not located near any public areas or public facilities.

County Siting Criterion No. 4. Provision of Public Services. The County criterion requires hazardous waste facilities to be located where adequate emergency response, public water, and sewer services are available; but it allows water, sewer services and emergency response capabilities to be privately owned and onsite where public services are not readily available. The proposed project would provide its own potable water supply, sewage system and emergency vehicles, and therefore meets this County criterion.

County Siting Criterion No. 5. Floodplain Areas. This County criterion allows residual repositories to be located in areas subject to a 100 year flood event, provided such facilities meet the requirements of the Regional Water Quality Control Board, pursuant to applicable state regulations (Title 23 CCR, Division 3, Chapter 15). Likewise, treatment facilities may be located in areas subject to 100 year floods if designed, constructed, operated and maintained to prevent failures due to such events. Although located in a floodplain, the Broadwell project has been engineered to prevent failure due to a 100 year flood, as discussed in detail in Sections 2.2.2 and 4.1.3 of the DEIR/S.

County Siting Criterion No. 6. Proximity to Active or Recently Active Faults. This County criterion requires that no specified hazardous waste facility be placed within 200 feet of an active or recently active fault. This criterion is met by the proposed project, as addressed by the applicant's siting criterion No. 2. A discussion of this criterion's applicability to Broadwell Dry Lake is located in Appendix D, and in Section 4.1.1.2 of the DEIR/S.

County Siting Criterion No. 7. Unstable Soils. Under this criterion, residual repositories cannot be located in the areas of potential rapid geologic change unless, in accordance with the County criterion's reference to Title 23 CCR Chapter 15, there is an acceptable engineered alternative to deal with such geologic changes. The proposed Broadwell Residuals Repository would be located on the lake bed in an area that might be characterized as susceptible to potential geologic change (i.e., desiccation features); however, the repository design provides an engineered alternative, as discussed in Sections 2.2.2.2 and 4.1.1.3 of the DEIR/S. The proposed treatment and storage facilities would not be located in areas of potential rapid geologic change, as further discussed in Sections 2.2.2.2 and 4.1.1.2 of the DEIR/S.

County Siting Criterion No. 8. Depth to Groundwater. Under this criterion, residual repositories must be located in areas which meet the requirements of Title 23 CCR, Chapter 15 and which meet the siting requirements of the State Water Resources Control Board. In contrast, treatment, recycling, storage and transfer facilities may be located in high groundwater areas if an engineered design of the containment structure is capable of withstanding geologic or soil failures which may arise. This County siting criterion is addressed by Broadwell's own siting criterion No. 3, and the discussion of its applicability to Broadwell Dry Lake is located in DEIR/S Appendix D. That discussion indicates that the water table is over 75 feet deep at all locations in the Broadwell Basin and thus, Broadwell Dry Lake meets this siting criterion.

County Siting Criterion No. 9. Major Recharge Areas for Aquifers. This County siting criterion prohibits residual repositories within any area known or suspected to be supplying principal recharge to a regional aquifer as defined in state, regional, or general plans. Treatment, recycling, storage and transfer facilities may be located within such principal recharge areas if they are designed, constructed and maintained to prevent accidental releases. This criterion is addressed by Broadwell's own siting criterion No. 3 and a discussion of its applicability to Broadwell Dry Lake is located in DEIR/S Appendix D. That discussion and page II-C-25 of the County General Plan both indicate that the Broadwell Basin does not supply principal recharge to a regional aquifer.

County Siting Criterion No. 10. Permeability of Surficial Materials. Under this County criterion, residual repositories must be located in areas where the underlying geology provides impermeability meeting the requirements of the State Water Resources Control Board pursuant to Title 23 CCR, Chapter 15. Treatment, recycling, storage and transfer facilities may be sited in areas where soils are permeable if adequate engineered features are included in the project design. This County criterion is addressed by the applicant's own siting criterion No. 1 and the discussion of its applicability to Broadwell Dry Lake is located in DEIR/S Appendix D. In addition, the permeability of the project area is discussed in more detail in Sections 3.3 and 4.1.3 of the DEIR/S. These discussions indicate that Broadwell Dry Lake meets the applicable permeability criterion.

County Siting Criterion No. 11. Non-attainment Air Areas. Under this criterion, hazardous waste facilities may be located in non-attainment air areas if the facility meets the plans and regulations of the local air quality agency and a risk assessment shows that this contribution is not significant when compared to the emissions from transportation of hazardous waste out of this area. As further discussed in Sections 4.1.7.2 and 4.1.7.3 of this DEIR/S, the Broadwell project will meet all local air quality standards as required by the San Bernardino County Air Pollution Control District. In addition, the risk assessment prepared on the proposed project indicates that the project's contribution is insignificant as mitigated (see Section 4.1.12.4 of the DEIR/S). Thus, as compared to emissions from transportation of hazardous waste out of the area, the project's contribution would be insignificant.

County Siting Criterion No. 12. Criteria Pollutants in PSD Areas. This County criterion applies to hazardous waste facilities located in PSD areas. This criterion does not apply to the Broadwell project because, as set forth in Section 3.8.2 of the DEIR/S, the project is not located in a PSD area; rather the project is located in a nonattainment area in which ozone and PM_{10} levels exceed ambient air quality standards.

County Siting Criterion No. 13. Wetlands. A hazardous waste facility is prohibited from impairing the viability of wetlands such as marshes, swamps and bogs inundated by surface or groundwater with a frequency to support, under normal circumstances, prevalence of vegetative or aquatic life which requires saturated soil conditions for growth and reproduction, as defined in general, regional, state and federal plans. Under normal circumstances Broadwell Dry Lake does not support vegetative or aquatic life requiring saturated soil conditions. Thus, under the criterion for wetlands identified in the CHWMP, Broadwell Dry Lake would not be considered a wetlands. A separate wetlands determination under the Clean Water Act will also be made as part of the U. S. Army Corps of Engineers review of this project.

County Siting Criterion No. 14. Habitats of threatened, rare or endangered species. Under this criterion, hazardous waste facilities are prohibited from impairing critical habitats of threatened, rare or endangered species as such species are listed under federal or state laws and such critical habitats are identified in general, regional, state, and federal plans. Based on a biological resource study and risk assessment conducted at the time of permitting, buffer zones may be required around the facility, under this criterion. The only potential threatened species at issue at the proposed project site, the desert tortoise, has been the subject of several surveys in the area. A biological assessment has been prepared on that subject and to date, the surveys at the project site have found little evidence of habitation or use by the desert tortoise. The biological surveys have found no other rare, threatened, or endangered species in the area. The proposed project impacts Category 3 Desert Tortoise Habitat, as defined by the BLM, which is not defined as the "critical habitat" protected by the CHWMP. The County siting criterion is therefore met.

County Siting Criterion No. 15. Prime agricultural lands. This County siting criterion requires that specified hazardous waste facilities not be sited on prime agricultural lands as defined under California law and local land use plans. This criterion is addressed by Broadwell's own siting criterion No. 8 and the discussion of its applicability to the Broadwell Dry Lake is located in DEIR/S Appendix D. This County criterion is met because no agricultural uses exist anywhere in the project area.

County Siting Criterion No. 16. Recreational, cultural, or aesthetic resources. This criterion requires that hazardous waste facilities not be located on public or private land located in recreational, cultural or aesthetic resource areas which have local, regional, state or national significance. Examples of such areas include national, state, regional county and local parks and recreation areas; historic resources; wild and scenic rivers; scenic highways; ecological preserves; public and private preservation areas; and other lands of local, regional, state or national significance. There are no national, state, regional, county or local parks or recreational areas in the vicinity of the Broadwell project. To the extent any historic resources exist in the area, they will be covered by mitigation implemented as part of the project as discussed in Section 4.1.6 of the DEIR/S. There are no wild and scenic rivers, scenic highways, or ecological preserves in the area. As discussed at length elsewhere in the DEIR/S, the project site is located in or near several Wilderness Study Areas, which are roadless federal public lands being considered by Congress for possible permanent wilderness status, or alternatively, for multiple uses. Other text in this document discusses the manner in which this project has been designed to minimize or avoid adverse effects on potential wilderness values. (See e.g., DEIR/S Section 4.1.11.3.) Part of the treatment and entrance facility and access for the project would be located within the boundaries of WSA 252. WSA 252 is not recommended by the BLM, nor in Senator Cranston's desert wilderness bill (S-21), as suitable for wilderness. Although the federal decision as to potential wilderness designation or release for multiple use is up to Congress rather than the BLM, the County is entitled to rely on all of the facts in reviewing the applicability of this County siting criterion. The County believes that WSA 252, and particularly those areas along its eastern border where the project's entrance and treatment facilities and access road would be located, lack wilderness characteristics or values, are unlikely to be included among designated wilderness areas, and are therefore not of local, regional, state or national significance.

County Siting Criterion No. 17. Areas of Potential Mineral Deposits. The County criterion requires that hazardous waste facilities not be located so as to preclude extraction of minerals necessary to sustain the State's economy. As discussed in Sections 3.2.4 and 4.1.1.2 of the DEIR/S, the only minerals in the project area are common varieties of clay, sand and gravel, which are so common that they are not necessary to sustain the State's economy.

County Siting Criterion No. 18. Military Lands. The County criterion requires that specified hazardous waste facilities not be sited on military lands. This criterion is addressed by Broadwell's own siting criterion No. 8 and the discussion of its applicability to Broadwell Dry Lake is located in DEIR/S Appendix D. This County criterion is met because the land proposed for project development does not include any military lands.

County Siting Criterion No. 19. Proximity to Areas of Waste Generation. Under this criterion, hazardous waste land disposal facilities may be located at a considerable distance from waste generation sources because of their requirement for large land and buffer areas. This reflects the County's desire that such facilities be sited in locations distant from populations and from ground and surface water resources used by these populations. Relatively speaking, Broadwell Dry Lake is nearer the Los Angeles Basin industrial areas than other potential alternative sites in actual distance, in ease of access and in travel time.

This criterion also states that treatment, storage, and transfer facilities should be close to hazardous waste generation sources to minimize the risk of transportation. Although the project's proposed treatment facility is located at a distance from the hazardous waste generation sources to which it expects to provide service, the following considerations should be noted: a) the Broadwell project is generally closer to hazardous waste generation resources than other currently available off-site treatment/storage facilities (e.g., Kettleman Hills); b) the siting of comprehensive treatment centers has not been allowed at other potential alternative locations nearer to the hazardous waste generation sources because such locations are in populated areas, raising public health and land use concerns; and c) the proposed project site, although at a distance from generation sources, was selected, and its proposed access features have been designed, to minimize the risks associated with transportation of hazardous wastes to the facility.

County Siting Criterion No. 20. Proximity to Major Transportation Routes. This County criterion requires specified hazardous waste facilities to have good access to and from major transportation routes. This County criterion was addressed by Broadwell's own siting criterion No. 5 and the discussion of its applicability to Broadwell Dry Lake is located in DEIR/S Appendix D. This County criterion is met as explained in Appendix D.

County Siting Criterion No. 21. Minimize Transport Through Minor Routes. This County criterion requires that hazardous waste facilities be sited so that road networks leading to major transportation routes do not pass through residential neighborhoods and should be safe with regard to road design and construction, excess traffic, etc. This County criterion is addressed by Broadwell's own siting criterion No. 5 and the discussion of its applicability to Broadwell Dry Lake is located in DEIR/S Appendix D. This County criterion is met as explained in Appendix D.

County Siting Criterion No. 22. Locational Restrictions Due to Transportation Routes. The detailed discussion of the County siting criteria at page 5-27 through page 5-31 of the County Hazardous Waste Management Plan lists 21 siting criteria. In contrast, Table 5-2 of that plan, which summarizes the recommended siting criteria, lists one more siting criterion, i.e., No. 22, entitled "Locational Restrictions Due to Transportation Routes". This siting criterion is not discussed in detail and apparently is covered by County siting criterion Nos. 19-21. This County siting criterion is addressed by Broadwell's own siting criterion No. 5, and the discussion of its applicability to Broadwell Dry Lake is located in DEIR/S Appendix D.